

IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

AGERE SYSTEMS, INC.,	:	CIVIL ACTION
Plaintiff,	:	
	:	
v.	:	
	:	
ATMEL CORPORATION,	:	NO. 02-CV-864
Defendant.	:	

MEMORANDUM

LEGROME D. DAVIS, J.

AUGUST 17, 2005

Presently before the Court are the Motion for Judgment as a Matter of Law, or in the Alternative, for a New Trial filed by Plaintiff Agere Systems, Inc. on April 5, 2005 (Doc. No. 335) and the Motion for Judgment as a Matter of Law filed by Defendant Atmel Corporation on April 5, 2005 (Doc. No. 336). For the reasons that follow, both parties' motions are GRANTED in part and DENIED in part. Specifically, Agere's motion for a new trial on the invalidity of the '827 patent is GRANTED and Atmel's motions for JMOL on the invalidity of the '126 patent as nonenabled and the invalidity of the '335 patent as obvious are GRANTED. The Court DENIES the remainder of the parties' motions.

This case involves four patents procured from the United States Patent and Trademark Office ("USPTO") by Plaintiff Agere Systems, Inc. ("Agere"): U.S. Patent Nos. 5,227,335 ("the '335 patent" or "the Holschwander '335 patent"); 6,323,126 ("the '126 patent" or "the Chittipeddi patent"); 5,102,827 ("the '827 patent" or "the Chen patent"); and 34,269 ("the '269 patent"). The '335, '126, and the '827 patents each recite specific steps used in the process of semiconductor fabrication, the process by which a wafer of silicon, also known as a "substrate," is transformed into a semiconductor chip that can be used in a variety of electronic devices. The '269 patent recites a method for packaging semiconductor chips after they have been fabricated.

Agere claimed at trial that Defendant Atmel Corporation (“Atmel”) was willfully infringing its patents by making, using, importing, selling, and offering to sell semiconductor chips that were fabricated or packaged using the steps and methods protected by those patents. Atmel claimed that it did not infringe Agere’s patents because its fabrication and packaging processes fell outside the scope of Agere’s asserted claims. Atmel further argued that the asserted claims were invalid for one or more of the following reasons: obviousness, anticipation by the prior art, indefiniteness, and lack of enablement.

After hearing approximately two and a half weeks of testimony, the jury in this matter deliberated for several days and returned a verdict as to Agere’s assertion of the following claims against Atmel and Atmel’s corresponding claims of non-infringement and invalidity: claims 1 through 6 and claim 11 of the ‘335 patent; claim 6 of the ‘126 patent; claims 1 through 3 of the ‘827 patent; and claims 6 and 9 of the ‘269 patent. The jury found that Atmel literally infringed all the asserted claims of the ‘335 patent; that the infringement was not willful; that claims 1 through 6 and claim 11 of the ‘335 patent were invalid as anticipated but not as obvious; and that claim 2 of the ‘335 patent was not invalid as indefinite. With respect to the ‘126 patent, the jury found that Atmel did not literally infringe claim 6; that claim 6 was invalid due to anticipation; and that claim 6 of the ‘126 patent was not invalid as indefinite or nonenabled. The jury further found that Atmel literally infringed all the asserted claims of the ‘827 patent, but that the infringement was not willful and that the claims were invalid as obvious. Lastly, the jury found that Atmel did not literally infringe claims 6 and 9 of the ‘269 patent and that claim 6 of the ‘269 patent was invalid as anticipated

Agere has moved for a new trial on several grounds, arguing that several of the jury’s verdicts were against the weight of the evidence, that the court committed various prejudicial

legal errors in admitting or failing to admit evidence, and that certain of the court's jury instructions were improper. Both parties have renewed their motions for judgment as a matter of law ("JMOL") made at the close of evidence at trial. Agere's motions relating to the Court's jury instruction and evidentiary rulings will be considered first. The Court will then, on a patent-by-patent basis, turn to each party's motions for JMOL and Agere's new trial motions.

**I. AGERE'S MOTIONS FOR NEW TRIAL BASED ON ERRONEOUS JURY INSTRUCTIONS**

Agere has moved for a new trial pursuant to Federal Rule of Civil Procedure 59 based on its contention that the Court's instructions to the jury were erroneous on the issues of invalidity and obviousness. Before the Court begins a discussion of the applicable standard of law and its specific instructions to the jury on those issues, a word on how those instructions were generated is in order. The Court charged the jury in this matter on March 21, 2005. On March 8, 2005, the parties submitted proposed jury instructions to the Court. See Doc. No. 293 (Jt. Proposed Jury Instructions dated Mar. 8, 2005). Consistent with the Court's policies and procedures, this submission contained the parties' agreed-upon points for charge, as well as disputed points for charge with support for each party's position on a particular issue. Before the Court instructed the jury, the parties and the Court agreed that the parties had preserved their objections to any instruction that they requested and were not given and that the jury would be given a written copy of the charge to guide their deliberations. 3/21/05 Tr. at 2-3. At the close of the Court's instruction, attorneys for both parties were invited to sidebar to register any further objections; as a result of these conversations, the Court issued several supplemental instructions to the jury, including instructions on obviousness. Id. at 65-66.

Where a party claims that a jury instruction was erroneous as a matter of law, the instruction is reviewed to determine "whether the charge, taken as a whole and viewed in light of

the evidence, fairly and adequately submit[ted] the issues in the case to the jury.” Link v. Mercedes-Benz of N. Am., Inc., 788 F.2d 918, 922 (3d Cir. 1986). A court’s review of a jury instruction should be undertaken with an eye towards the instructions in their totality and “not a particular sentence or paragraph in isolation.” In re Braen, 900 F.2d 621, 626 (3d Cir. 1990), cert. denied, 498 U.S. 1066 (1991). In addition to showing that the Court committed legal error in giving a certain instruction, a party must also show that the error had a prejudicial effect. Advanced Display Sys., Inc. v. Kent State Univ., 212 F.3d 1272, 1281 (Fed. Cir. 2000). Prejudicial legal error exists where “it ‘appears to the court [that the error is] inconsistent with substantial justice.’” Id. at 1281 (citing Fed. R. Civ. P. 61).

**A. The Court’s instructions on invalidity were proper.**

Agere claims that the Court’s instruction on the issue of invalidity amounted to prejudicial error because it failed to properly define the “clear and convincing” evidence standard and to properly inform the jury that each claim of Agere’s patents is presumed valid under the law. The Court finds these contentions to be without merit.

It is well established that a patent is presumed valid under 35 U.S.C. § 282. According to the Federal Circuit, an attack on the validity of a patent is successful if proved by “clear and convincing evidence or its equivalent, by whatever form of words it may be expressed.” Am. Hoist & Derrick Co. v. Sowa & Sons, 725 F.2d 1350, 1360 (Fed. Cir.), cert. denied, 469 U.S. 821 (1984). A party has met the clear and convincing standard where it “places in the ultimate factfinder an abiding conviction that the truth of its factual contentions are highly probable.” Colorado v. New Mexico, 467 U.S. 310, 316 (1984) (internal citation omitted) cited in Buildex Inc. v. Kason Indus., Inc., 849 F.2d 1461, 1463 (Fed. Cir. 1988). According to the Federal Circuit, the presumption of validity and the heightened burden of proving invalidity “are static

and in reality different expressions of the same thing — a single hurdle to be cleared.” Chiron Corp. v. Genentech, Inc., 363 F.3d 1247, 1258 (Fed. Cir. 2004).

The Court’s jury instruction on the issue of the clear and convincing burden of proof with respect to invalidity began as follows, “you have to decide by clear and convincing evidence on a claim-by-claim basis whether any of the claims or certain of the claims of the patents in suit are invalid.” 3/21/05 Tr. at 7. The Court went on to elucidate the clear and convincing evidence standard: “this is a *higher burden of proof* [than preponderance of the evidence]. It requires that you must be persuaded that what the party seeks to prove is highly probable. It’s highly probable that what they seek to prove is true. And this standard applies to issues of willful infringement and invalidity.” 3/21/05 Tr. at 9 (emphasis added). Later in its instruction, the Court reiterated that Atmel was required, in order to make a showing of invalidity, to show by “clear and convincing evidence that a particular claim is invalid” and that “this defense must be considered on a *claim-by-claim, patent-by-patent basis*.” Id. at 37, 39 (emphasis added); see also Id. at 40, 41, 43, 47 (reiterating that clear and convincing standard applied to invalidity).

To begin, the plain text of the Court’s instruction belies Agere’s argument that the Court prejudicially understated the applicable burden of proof, as its instruction properly communicated to the jury the gravity of Atmel’s burden, using language practically identical to the Supreme Court’s in Colorado v. New Mexico. Given this clear explanation of the applicable burden of proof, Agere’s argument that the Court erred in failing to explicitly instruct the jury that each individual patent claim is presumed valid must also fail, as the Federal Circuit has clearly held that a district court does not err failing to so instruct when the instruction on the burden of proof has been adequate. Chiron Corp., 363 F.3d at 1259. Lastly, the Court clearly instructed the jury that Atmel was required to carry its burden on proof on each individual claim

of each patent-in-suit, contradicting Agere's claim that the instruction somehow sanctioned the legally flawed argument that certain claims "rise and fall" with others.<sup>1</sup>

**B. The Court's instructions on obviousness were proper.**

Agere also objects to the Court's instructions to the jury regarding the legal standard for obviousness and the necessary underlying factual determination of the existence of a motivation to combine. Agere further argues that the Court's failure provide the jury with Agere's proffered instruction on secondary considerations (or objective evidence) of non-obviousness was also prejudicial error. Again, the Court's review of its instruction reveals no error warranting a new trial on the issue on obviousness.

35 U.S.C. § 103 provides that a patent may not issue "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103. The question of obviousness under this section is a question of law. See, e.g., Graham v. John Deere Co., 383 U.S. 1, 17 (1966); Stevenson v. ITC, 612 F.2d 546, 549 (C.C.P.A. 1979). Underlying this legal conclusion are several factual issues that a finder of fact must resolve, namely (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) whatever objective evidence may be present as indicia of nonobviousness. Graham, 383 U.S. at 17. Where a party claims that an invention is obvious in view of a combination of pieces of prior art, that party cannot establish obviousness without "some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in the way that would produce

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<sup>1</sup> Agere's motion for a new trial based on its claim that the Court erroneously allowed Atmel to make this argument before the jury is discussed at length later in his memorandum.

the claimed invention.” Karsten Mfg. Corp. v. Cleveland Golf Co., 242 F.3d 1376, 1385 (Fed. Cir. 2001). This requirement is designed to prevent a finder of fact from engaging in a hindsight-based analysis of the obviousness of a particular invention. See Ruiz v. AB Chance Co., 234 F.3d 654, 664-65 (Fed. Cir. 2000).

Agere’s first objection is that the Court failed to read a sentence in the parties’ agreed-upon instruction to the jury on the issue of the motivation to combine. That sentence reads as follows: “It is not enough that all of the elements of a patent claim are found in the prior art if there is no suggestion or motivation in the prior art to combine those elements.” Agere contends that the Court’s omission of this sentence renders its instruction on the issue of obviousness legally deficient and requires a new trial on the issue of obviousness.

While it is true that the Court neglected to read this single sentence, it did instruct the jury as follows:

if you find the prior art shows each of the elements in the claim you have to determine whether it would have been obvious to a person of ordinary skill in the art to combine these elements in the same manner as the claim at issue. Combination of prior art references is improper unless the prior art suggests making the combination. It has to be motivation or suggestion or teaching of the desirability of making the specific combination of elements that was made. Obviousness is tested by the combined teachings that would have been suggested by one of ordinary skill in the art. And in determining obviousness you can’t pick and choose among the individual elements of the assorted prior art references to create the claimed invention. Thus, Atmel must prove by clear and convincing evidence that there is some teaching or suggesting in the references to support their use in a particular claimed invention.

3/21/05 Tr. at 51-52. After the Court so instructed the jury, Agere requested, at sidebar, an additional instruction on motivation to combine, which prompted the Court to inform the jury of

the difficulty that attaches through all honest attempts to answer the question of obviousness can be attributed to the strong temptation to rely on hindsight . . . it is wrong to use Agere’s patents as guides through the maze of prior art references, [combining] certain references in a way so as to achieve the result of the claims in suit.

Id. at 65. The Court fails to see how its instruction, taken as a whole, did not fairly and adequately submit the issue of motivation to combine to the jury. The missing sentence cited by Agere is merely duplicative of concepts contained in the Court's instruction and its omission was legally insignificant.

Agere's second objection to the Court's instruction on obviousness is the Court's failure to include one of Agere's proposed instruction on secondary considerations of non-obviousness, which read that "Thus, even if you find the prior available art shows each of the elements of the claims at issue, objective evidence of one or more of these factors tends to show non-obviousness of the claims at issue. Not all of the factors have to apply to make a claim valid." Agere argues that the exclusion of these two sentences was prejudicial and legally incorrect because a Japanese patent known at trial as the "Hitachi patent," proffered by Atmel as prior art, teaches all the steps in Agere's '827 patent, though in a different order. Agere therefore requests a new trial on the obviousness of the '827 patent.

The Court's instruction on secondary factors included a recitation of the seven indicia of non-obviousness as agreed-upon by the parties, using the disjunctive "or" to indicate to the jury that it was not necessary to find all of the indicia to reach a conclusion of non-obviousness. 3/21/05 Tr. at 52. The Court went on to state, as the parties requested, "the evidence might indicate to you that what the inventors did was obvious to try . . . obvious to try is not the standard. The standard is whether the invention as a whole would have been obvious to a person of ordinary skill in the field at the time the invention was made." Id. at 52-53. While Agere's suggested instruction might have highlighted for the jury the exact factual scenario created by a comparison of Hitachi and the '827 patent, the jury was clearly instructed on how to use



evidence of secondary factors in its determination of obviousness. Agere's motion for a new trial on the '827 patent on this ground must fail.

The Court can find no prejudicial error in its jury instructions on obviousness and invalidity. As a general matter, a party is entitled to a jury instruction that accurately and fairly sets forth the current status of the law. See McPhee v. Reichel, 461 F.2d 947, 950 (3d Cir. 1972) ("It is the responsibility of the trial judge to provide the jury with a clear and accurate statement of the law. . . ."). This does not provide a litigant with the right to a jury instruction "of its choice, or precisely in the manner and words of its own preference." Douglas v. Owens, 50 F.3d 1226, 1233 (3d Cir. 1995) (citing Heller Int'l Corp. v. Sharp, 974 F.2d 850, 860 (7th Cir. 1992); Anderson v. Branen, 17 F.3d 552, 559-60 (2d Cir. 1994)). Agere received instructions that complied with the Court's duty to explain to the jury, in a dispassionate and accurate way, the current state of the law on obviousness and invalidity, though it did not do so using each and every word that Agere proposed to the Court. Neither party received precisely the jury charge that it requested, but that is not proper grounds for a new trial absent prejudicial legal error. For the foregoing reasons, Agere's motion for a new trial based on the Court's jury charge is denied.

## **II. AGERE'S MOTIONS FOR NEW TRIAL BASED ON ERRONEOUS EVIDENTIARY RULINGS**

Agere asserts that the Court made four separate legal rulings regarding the admissibility of evidence that were so erroneous and prejudicial as to warrant a new trial. Motions for a new trial based on the improper introduction or exclusion of evidence are subject to the harmless error standard of Federal Rule of Civil Procedure 61:

No error in either the admission or the exclusion of evidence and no error or defect in any ruling or order or in anything done or omitted by the court or by any of the parties is ground for granting a new trial or for setting aside a verdict or for vacating, modifying, or otherwise disturbing a judgment or order, unless refusal to take such action appears to the court inconsistent with substantial justice. The

court at every stage of the proceeding must disregard any error or defect in the proceeding which does not affect the substantial rights of the parties.

Fed. R. Civ. P. 61; Becker v. Arco Chem. Co., 207 F.3d 176, 180 (3d Cir. 2000). Keeping the Rule's mandate in mind, the Court will examine Agere's contentions in turn.

**A. Agere has waived its objection to Dr. Rana's testimony regarding inventive activity at IBM.**

At trial, Dr. Virenda Rana, the inventor of the '335 patent, testified to certain inventive activity at IBM, and his assessment of that activity's effect on the validity of the '335 patent. Agere claims that the admission of this testimony was erroneous because Dr. Rana was not disclosed as an expert witness and because he had no personal knowledge of the IBM processes to which he testified. Agere contends that the introduction of this testimony was prejudicial and warrants a new trial on the anticipation of the '335 patent.

Prior to Dr. Rana's appearance in court, Agere moved twice to preclude his testimony. First, Agere made a pre-trial motion *in limine* to prevent Dr. Rana from testifying based on the theory of assignor estoppel, Doc. No. 202 (Sixth Mot. *in Limine* dated Feb. 10, 2005); the Court denied this motion in writing on February 24, 2005. Doc. No. 256 (Order dated Feb. 24, 2005). To the extent that Agere seeks to resuscitate its objection to Dr. Rana's testimony on that ground, see Doc. No. 338 at 15 n.8 (Pl.'s Memo. of Law dated Apr. 22, 2005), that motion is denied for the reasons articulated in the Court's Order of February 24, 2005. See Doc. No. 256.

Second, Agere moved to preclude Dr. Rana's testimony on March 8, 2005, after Atmel informed the Court that he would be testifying live at trial, rather than by videoconference, and that he would testify to his opinion that the '335 patent was invalid in light of the prior inventive work at IBM. See Doc. No. 292 (Mot. to Preclude dated Mar. 8, 2005). The grounds for Agere's trial motion to preclude are identical to those it advances in its current motion. After

Agere's second motion was filed, the Court engaged counsel in several on-the-record conversations at trial with respect to Dr. Rana's testimony. Several of these conversations took place at sidebar and were not, for some reason, adequately recorded by the Court's electronic recording system. See, e.g., 3/14/05 Tr. at 191-97. Nevertheless, the trial record bears out that the parties argued the overall admissibility of Dr. Rana's testimony and that the Court ultimately allowed him to take the stand for direct examination by counsel for Atmel. 3/15/05 Tr. at 5-10. The portions of the record that do exist also indicate that, with respect to the permissible scope of Dr. Rana's testimony, conversations between the Court and counsel focused on the fact that it should properly be limited to those areas in which he had personal knowledge – his invention as it was memorialized by the '335 patent and his awareness of the state of the prior art at the time of his invention. Id.; 3/14/05 Tr. at 194-97. At the August 4, 2005 hearing on these motions, counsel for Agere recalled the substance of these conversations to be consistent with this description. 8/4/05 Hrng. Tr. at 7.

At trial, Dr. Rana's initial testimony centered on the content of his invention as encapsulated by the '335 patent and the state of the prior art at the time of the invention. Rana 3/14/05 Tr. at 13-19. Dr. Rana also testified, on direct examination, as to his knowledge of IBM Processes A and B at the time the '335 patent was being developed and filed with the USPTO; he further examined an IBM invention disclosure dated October 22, 1985 (Trial Exhibit 1111) and compared his invention with that described in the IBM document. Id. at 19-26. Then, approximately halfway through Dr. Rana's testimony, the following exchange took place between counsel and the Court, after counsel for Atmel asked Dr. Rana, "In Process A [as described in Trial Exhibit 1111] here can you tell us what you believe, as you understand your invention, is the glue layer?":

Agere Counsel: Object, your honor, I think this is beyond what we discussed in the context of what Dr. Rana could testify to.  
Court: Any answer?  
Atmel Counsel: I think it's what he's testified about, what his invention is and what he understands. He's referred to this as what he thought was –  
Court: All right, it's overruled, it's overruled, go ahead sir.

Id. at 26-27. This was the only contemporaneous objection made by Agere's counsel during Dr. Rana's testimony that even remotely relates the subject of the instant motion.

The Court finds that Agere failed to preserve its present objections to Dr. Rana's testimony by entering contemporaneous objections at trial. Federal Rule of Evidence 103(a) requires that a timely objection be made in order to preserve an issue for appeal. While the Court recognizes that the Third Circuit has noted that Rule 103(a) must be read in conjunction with Federal Rule of Civil Procedure 46, which states that formal exceptions are unnecessary, this is not a case in which Agere would have merely been required to lodge a formal objection. Am. Home Assur. Co. v. Sunshine Supermarket, 753 F.2d 321, 324 (3d Cir. 1985). The Court made clear to counsel that Dr. Rana's testimony would be admissible as a whole, but as to issues which ventured into expert testimony territory or to which he had no personal knowledge, "It depends upon the question – the way the question is phrased." 3/14/05 Tr. at 196. Agere writes in its reply brief that "Atmel spend roughly double the amount of time questioning Dr. Rana on matters pertaining to the IBM Processes than questions regarding the '335 patent, and cites nine full pages of trial testimony that it alleges is improper. Doc. No. 350 at 18 n.16 (Pl.'s Reply dated Jun. 6, 2005). Yet, Agere made only one, very general, objection to this testimony at trial. Agere's failure to object as Atmel's counsel further questioned Dr. Rana on a comparison between his invention and the IBM Processes is especially egregious, as Agere well knew what the substance of Dr. Rana's testimony would be on that subject.

Agere cites the Third Circuit's opinion in American Home in support of its contention that its Motion in Limine was sufficient to preserve its objection for appeal. The Court notes that, in American Home, the Third Circuit found it decisive that the trial court had issued a "definitive oral ruling with no suggestion that it would reconsider the matter at trial." Under these circumstances, the Third Circuit declined to require counsel to formally object to the introduction of the evidence at trial, as such objection would be unnecessary under Rule 46. Am. Home, 753 F.2d at 326. The instant case is not in the same posture as American Home. The Court was clear with the parties that Dr. Rana's testimony would be admissible on a question-by-question basis. Agere allowed Atmel's attorney to improperly question Dr. Rana for approximately one quarter of his direct testimony without specific objection. Because the Court's rulings on Dr. Rana's testimony were not sufficiently final to excuse Agere's obligation to properly bring its objection to the Court's attention and to provide the Court an opportunity to resolve those issues, the Court finds that Agere has not preserved the issue for appeal.

**B. Atmel did not improperly argue a legally erroneous "stand or fall" theory to the jury.**

Agere points to three separate places in the record where it claims that Atmel impermissibly advanced the argument to the jury that all the dependent claims of the '335 patent "stand or fall" with independent claim 1. Agere argues that these statements are in clear contravention of the presumption of validity that each claim enjoys under 35 U.S.C. § 282 and that the Court's failure to stop Atmel from making these arguments was so prejudicial as to warrant a new trial. Atmel responds that it merely pointed out that the inventors of the '335 patent told the USPTO that their dependent claims stood or fell with claim 1 and that it never argued to the jury that it should only consider the validity of the independent claim rather than considering the validity of all claims, independent and dependent.

Atmel's contention at trial was that the only "invention" contained in the '335 patent was the use of titanium nitride as a glue layer; this theory was based on a statement made by the inventors of the '335 patent to the USPTO that "Only claim 1 will be argued, and the dependent claims will stand or fall with claim 1."<sup>2</sup> 3/3/05 Tr. at 165. Agere objects to Atmel's repetition of the inventors' statement at trial, as well as the testimony it elicited on the consequences of that statement. The statements in dispute are as follows. During opening arguments, counsel for Defendant stated, during his discussion of the '335 patent's prosecution history, that when the inventors of the '335 patent appealed the examiner's decision that the patent should not issue, they "said the dependent claims, which are now 2 through 11, stand or fall with claim 1, stand or fall. What that means – and here we've put up the regulation that governs this – is it means that the stand or fall together unless the inventors made an arguments as to why the individual patent claims are separately patentable." 3/2/05 Tr. at 13. Atmel cross-examined Agere's expert, Dr. Reif, on the meaning of this statement in the context of a patent prosecution as well as probing its own expert, Dr. Thomas, on that same issue. Reif 3/3/05 Tr. at 165-66; Thomas 3/16/05 Tr. at 75-76.

The Court finds that these statements were not inappropriate. Placed in context, these statements do no more than reveal the position that Agere took while prosecuting its patent and what effect that position had on the way the USPTO patent examiners approached their evaluation of that patent. Moreover, as Atmel point out, the statements of the '335 inventors are relevant to the issue of whether the dependent claims of the '335 patent are invalid as obvious, because they bear upon the scope and content of the known art at the time. To the extent that the jury might have been confused by Atmel's discussion of the Patent Office's procedure for

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<sup>2</sup> Claim 1 teaches a "method of fabricating an integrated circuit chip" in which a glue layer comprised of "at least one member selected from the group consisting of conducting nitrides" is situated between a patterned dielectric and CVD tungsten.

evaluating dependent and independent claims, the Court's instruction on the validity of Agere's patents and Atmel's heavy burden in showing the invalidity of each claim of those patents was sufficient to cure any such confusion.

As Atmel's presentation on the '335 inventors "stand or fall" statement was neither improper nor prejudicial to Agere, Agere's challenge to the jury's verdict that claims 1 through 6 and claim 11 of the '335 patent were invalid fails.

**C. There was no error in the Court's exclusion of Dr. Kohl's testing results.**

Agere has moved for a new trial on the infringement of the '269 patent based on the Court's exclusion of certain testing performed by Dr. Paul Kohl on the issue of whether Atmel's semiconductor packaging contains deformation absorbing members that infringe claims 6 and 9 of the '269 patent. As will be explained in more detail later in this memorandum, the mounting of a semiconductor chip requires that a structure known as a "paddle" be pressed downwards, which often causes attached structures known as "paddle support arms" to be deformed. The invention of the '269 patent is a structure known as a "deformation absorbing member," which acts to minimize the deformation to the paddle support arms.

At trial, Atmel claimed that its packaging process did not infringe the '269 patent because its process uses a "clamping" step to isolate the paddle support arms from any deformation, negating the need for a deformation absorbing member as taught in the '269 patent. Agere sought to introduce the testimony of Dr. Kohl, whose testing lead him to conclude that Atmel's clamping process could not totally isolate the paddle support arms from the strain that causes deformation. Atmel filed a motion *in limine* to exclude Dr. Kohl's testing prior to trial, which the Court denied based on its conclusion that report and the methodologies and reasoning contained therein were reliable and that Defendant would have a full opportunity at trial to cross-

examine Dr. Kohl on any weaknesses in his methodologies and conclusions. See Doc. Nos. 223 (Mot. in Limine dated Feb. 10, 2005); 260 (Order dated Feb. 24, 2005).

At trial, when Dr. Kohl began to testify about the results of his testing, counsel for Atmel objected to the instruction of that testimony on relevance grounds; namely, that Dr. Kohl's testing was not performed on any Atmel product or any lead frame on an Atmel product. Kohl 3/ 7/05 Tr. at 208. The Court permitted Agere's counsel to attempt to build a foundation for the admissibility of the testing results; after a second objection was lodged, the Court held a conversation at sidebar with the parties, during which Agere's counsel confirmed that Dr. Kohl had performed his tests using Agere lead frames, rather than Atmel's, leading the Court to sustain the objection on relevance grounds. Id. at 211-12. A similar objection to testimony regarding Dr. Kohl's test results was sustained later in his direct examination. Id. at 219-20.

Rule 702 of the Federal Rules of Evidence governs the admission of expert testimony in federal court:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

Fed. R. Evid. 702. The Rule's three requirements are well known to litigants: (1) the proffered witness must be a qualified expert; (2) the expert must testify about matters requiring scientific, technical, or specialized knowledge; and (3) the expert's testimony must "fit" the facts of the case. See Kannankeril v. Terminix Int'l, Inc., 128 F.3d 802, 806 (3d Cir. 1997); see also Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 592 (1993). The Supreme Court in Daubert emphasized the district court's "gatekeeping" function to protect against the admission of expert testimony that is unreliable or unhelpful to the trier of fact. Daubert, 509 U.S. at 592-95.



The Court's rejection of Dr. Kohl's testimony at trial was premised on Rule 702's requirement that the evidence or testimony must "assist the trier of fact to understand the evidence or to determine a fact in issue." As the Supreme Court noted in Daubert, "this condition goes primarily to relevance," which was Atmel's ground for objection. Id. at 591. The Court found that Dr. Kohl's testing of Atmel's clamping process, which was conducted on lead frames belonging to Plaintiff, was not relevant to the question of whether Defendant's process is capable of totally isolate the paddle support arms *on the lead frames used by Defendant* from the strain that causes deformation. While Agere is understandably distressed that the Court reconsidered its original ruling that testimony regarding Dr. Kohl's testimony was admissible, the Court finds no legal error in its determination at trial that his testimony's lack of relevance rendered it inadmissible.

In its response to Plaintiff's motion, Atmel offers a variety of other rationales for the exclusion of Dr. Kohl's testimony regarding his test results, one of which the Court believes merits mentioning. At trial, Dr. Kohl testified that, before he began the testing at issue, he had already reached the conclusion that Atmel's process infringed the asserted claims; this conclusion was based on a review of documentary evidence. Kohl 3/ 7/05 Tr. at 207, 210. He stated that he performed the testing only for confirmatory purposes. Id. at 210. Counsel was free to examine Dr. Kohl as extensively as they wished on his documentary review, his personal knowledge on the subject of semiconductor packaging, and the conclusions that he drew from the combination thereof. As such, the Court believes that even if its ruling that Dr. Kohl's testimony on his clamping tests was erroneous, it was the kind of error that should be

disregarded as harmless under Rule 61.<sup>3</sup> Agere's motion for a new trial on the infringement of the asserted claims of the '269 patent is therefore denied.

**D. Atmel did not improperly argue claim construction to the jury.**

Agere alleges that this Court committed prejudicial error in allowing Atmel to argue a claim interpretation to the jury regarding the following limitation of claim 6 of the '126 patent: "exposing said layer of material to WF.sub.6, thereby forming a tungsten plug which completely fills said opening, and forming a tungsten layer which covers said dielectric." Specifically, Agere argues that Atmel improperly advanced theories of invalidity and non-infringement that depended on constructions of the terms "completely fills" and "thereby" not sanctioned by this Court. Agere also argues that Atmel's expert, Dr. Thomas, improperly offered testimony on the proper construction of those two terms. As a result of these alleged prejudicial errors, Agere requests a new trial on the invalidity and infringement of claim 6 of the '126 patent.

The Court begins by noting that, at the Markman hearing on this matter, neither party offered any proposals or evidence regarding the construction of any of the '126 patent claims. Because no terms were disputed, the Court did not construe any of the terms in the '126 patent. See Doc. No. 63 (Cl. Construction Order dated May 27, 2003); see also U.S. Surgical Corp. v. Ethicon, Inc., 103 F.3d 1554, 1568 (Fed. Cir. 1997) ("Claim construction is a matter of resolution of disputed meanings and technical scope . . ."). Prior to trial, both parties moved this Court to preclude their opponent from advancing certain constructions of the terms "thereby" and "completely fills" because they claimed that the other party's presentation on the issue

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<sup>3</sup> Agere claims that the prejudice resulting from the Court's exclusion of Dr. Kohl's testing results was compounded by the Court's action in allowing Atmel's expert, Dr. Prince, to testify accompanied by a seven-and-a-half minute animation showing what clamping during a paddle downsetting process would look like. Dr. Prince, who was qualified as an expert in packaging and lead frame design, developed this animation after consultation with Atmel's lead frame manufacturer's in the Far East. Prince 3/10/05 Tr. at 161,163-64. Given Dr. Prince's educational and professional experience in the packaging area and his consultation with Atmel's actual lead frame manufacturer's, the Court finds that the admission of his animation was not improper.

would depart from the plain and ordinary meaning of the terms. See Doc. No. 205 (Agere Mot. in Limine dated Feb. 10, 2005); Doc. No. 217 (Atmel Mot. in Limine dated Feb. 10, 2005). Agere also requested that the Court preclude Atmel from presenting any evidence on the scope and meaning of those terms. In its motion, Agere wrote that it “respectfully requests that the Court deny any request by Defendant at this late hour for the Court to construe the claims of the ‘126 patent.” Id. at 3. The Court denied both parties’ motions, stating that it would “provide both Plaintiff and Defendant with the opportunity to, in the Defendant’s own words, ‘to present its case to the jury based on its belief as to what the plain and ordinary meaning of the patents’ language is.” Doc. No. 270 at 3 (Order dated Feb. 28, 2005). Consistent with this mandate, in its charge to the jury, after a recitation of the claims that were construed by the Court at the request of the parties, the Court explained its obligations with respect to the interpretation of both construed and unconstrued claims:

[T]hose [construed] terms are the meaning of the words in the patent as a matter of law. . . . those meanings are binding upon you . . . And to the extent that words are not defined as a matter of law then obviously they have the ordinary meaning that you understand the words to mean.

3/21/05 Tr. at 28-29.

Agere charges that, despite the presence of this instruction, the Court impermissibly allowed Atmel to elicit testimony from Dr. Thomas that improperly construed the two terms at issue. The Court has examined the portions of Dr. Thomas’ testimony that Agere alleges improperly construe the terms “thereby” and “completely fills.” The cited testimony consists of Dr. Thomas describing the steps in the accused Atmel process, then rendering his expert opinion as to whether that process infringes the claims of the ‘126 patent. Thomas 3/16/05 Tr. at 95-100. The Court can find no testimony by Dr. Thomas that could be considered impermissible claim construction and notes that Agere failed to object even once during the cited testimony.

Agere next argues that the Court should have precluded Atmel from making any invalidity and infringement arguments at trial, because it waived those arguments by failing to dispute the meaning and scope the '126 claim. The only applicable case law cited by Agere in support of this contention is Monsanto Co. v. Trantham, 156 F. Supp. 2d 855 (W.D. Tenn.), in which the Western District of Tennessee. In that case, the court found that because the Defendant waived any arguments of invalidity through claim construction at a status conference, it was estopped from arguing patent invalidity and non-infringement at trial. Id. at 867. That case, however, was based on its specific facts, which are not present in this case, and the Court can find no other federal case law and no binding precedent from the Federal Circuit that supports this result.

Lastly, Agere makes the argument that the Court, after denying its pre-trial Motion in Limine, had an obligation to construe the claims and instruct the jury on their proper meaning and that it committed legal error by failing to do so. This position on the construction of the cited claims of the '126 patent is directly opposed to the one that Agere has maintained for almost two years. Agere itself, in its Motion in Limine, specifically asked the Court not to construe the terms at issue, a position that it maintained at claim construction, then again in October 2003 in its opposition to a motion for summary judgment filed by Agere. See Doc. No. 115 at 17 (Opp'n to Mot. for S.J. dated 10/13/03, stating that "the time for claim construction has passed"); Doc. No. 205 Tr. at 3 (Mot. in Limine dated 2/10/05, stating that a request for claim construction "would be untimely, procedurally improper, and unfairly prejudicial to Agere"). Agere is therefore estopped from making the argument that the Court erred in doing exactly what Agere asked it to do. See, e.g., Fleck v. KDI Sylvan Pools, Inc., 981 F.2d 107, 116 (3d Cir. 1992) ("When a litigant takes an unequivocal position at trial, he cannot on appeal assume a

contrary position simply because the decision in retrospect was a tactical mistake, or perhaps a candid but regretted concession.”).

Moreover, the cases cited by Agere in support of this proposition, Markman v. Westview Instruments, Inc., 517 U.S. 370 (1996) and Sulzer Textil A.G. v. Picanol N.V., 358 F.2d 1356 (Fed. Cir. 2004), do not stand for the proposition that a court must construe claim terms on the eve of trial when both parties have previously agreed to allow the terms to have their plain and ordinary meaning. Rather, these cases stand for the proposition that a trial court has the obligation to give the jury “guidance that can be understood and given effect by the jury once it resolves the issues of fact which are in dispute,” Markman, 517 U.S. at 388, and that “it is the duty of the trial courts in patent cases in which claim construction rulings on disputed claim terms are made prior to trial and followed by the parties during the course of the trial to inform jurors both of the court’s claim construction rulings on all disputed claim terms and of the jury’s obligation to adopt and apply the court’s determined meanings of disputed claim terms to the jury’s deliberation of the facts.” Sulzer Textil, 358 F.2d at 1366. The Court believes that the record and the jury instruction cited above reflect that the Court did exactly that.

In short, the parties did not dispute the scope and meaning of these terms at claim construction. As such, the Court did not construe the claims. The Court then permitted each party at trial, to present expert testimony on the steps in their claimed and accused processes. The Court then submitted the factual question of whether Atmel’s accused process, which exposes silicon to tungsten hexafluoride (“WF<sub>6</sub>” or “WF.sub.6”) and other gases, meets the limitation of claim 6 of the ‘126 patent: “exposing said layer of material to WF.sub.6, thereby forming a tungsten plug which completely fills said opening, and forming a tungsten layer which covers said dielectric.” The jury was properly instructed to give the language of claim 6 its plain

and ordinary meaning. The Court can find no reversible error in that series of events. As such, Agere's motion for a new trial on this ground is denied.

### **III. MOTIONS FOR NEW TRIAL AND JMOL**

Agere and Atmel have moved for a judgment as a matter of law ("JMOL") pursuant to Rule 50 of the Federal Rules of Civil Procedure. Agere has renewed its motions for JMOL on the following issues: (1) the anticipation of the asserted claims of the '335 patent; (2) the anticipation of claim 6 of the '269 patent; and (3) the obviousness of claim 6 of the '126 patent. Atmel has renewed its motions for JMOL on the following issues: (1) the non-enablement and the indefiniteness of the '126 patent; (2) the non-infringement of the asserted claims of the '335 patent; and (3) the obviousness of the asserted claims of the '335 patent. Agere has additionally moved for a new trial pursuant to Rule 59 of the Federal Rules of Civil Procedure. Agere has requested a new trial on the following issues: (1) the anticipation of the asserted claims of the '335 patent; (2) the obviousness of the asserted claims of the '335 patent; (3) the anticipation of claim 6 of the '126 patent; (4) the obviousness of claim 6 of the '126 patent; (5) the infringement of claim 6 of the '126 patent; (6) the anticipation of claim 6 of the '269 patent; and (7) the obviousness of the asserted claims of the '827 patent.

The parties' motions for JMOL and Agere's motions for new trial will be addressed patent-by-patent. With respect to Agere's motions for JMOL, Atmel argues that certain of these motions are procedurally barred, as Agere failed preserve them prior to the jury's verdict. This argument will be addressed as the Court considers the motions related to each patent-in-suit.

## A. Standards of Law

### 1. Motion for Judgment as a Matter of Law

A court may properly grant a motion for judgment as a matter of law only where “there is no legally sufficient evidentiary basis for a reasonable jury” to find in favor of the non-moving party. Fed. R. Civ. P. 50(a)(1). In making this determination, a court is bound to review the record as a whole and to “draw all reasonable inferences in favor of the non-moving party.” Reeves v. Sanderson Plumbing Prods., Inc., 530 U.S. 133, 150 (2000). In conducting its review of the evidence, a court may not make credibility determinations, weigh the evidence, or develop its own version of the facts, as these functions are within the province of the jury and not the judge. Id.; see also Lightning Lube, Inc. v. Witco Corp., 4 F.3d 1153, 1166 (3d Cir. 1993). With respect to what, exactly, constitutes a legally sufficient evidentiary basis for a jury’s verdict, the Third Circuit has stated: “Federal courts do not follow the rule that a scintilla of evidence is enough. The question is not whether there is literally no evidence supporting the party against whom the motion is directed but whether there is evidence upon which the jury could properly find a verdict for that party.” Walter v. Holiday Inns, Inc., 985 F.2d 1232, 1238 (3d Cir. 1993) (internal quotations omitted). The presence of contrasting evidence from which different and conflicting conclusions might be drawn is not sufficient to overturn a jury’s verdict, as the jury is presumed to have evaluated that contradictory evidence and to have properly decided the matter one way or another. Fireman’s Fund Ins. Co. v. Videfreeze Corp., 540 F.2d 1171, 1178 (3d Cir. 1976). The sole question for the court is whether the record contains a “minimum quantum of evidence from which a jury might reasonably afford relief.” Id. (citing Denneny v. Siegel, 407 F.2d 433, 439 (3d Cir. 1969).

Where the moving party bears the burden of proof, the Third Circuit applies a different standard. See Fireman's Fund, 540 F.2d at 1177. This standard “requires the judge to test the body of evidence not for its insufficiency to support a finding, but rather for its overwhelming effect,” meaning that he or she must be able to say “not only that there is sufficient evidence to support the finding, even though other evidence could support as well a contrary finding, but additionally that there is insufficient evidence for permitting any different finding.” Id. See also, Mentor H/S, Inc. v. Med. Device Alliance, Inc., 244 F.3d 1365, 1375 (Fed. Cir. 2001) (stating that a defendant moving for JMOL on invalidity grounds must show that “[it] has established its case by evidence that the jury would not be at liberty to disbelieve and the only reasonable conclusion is in its favor.”).

As a threshold matter, Federal Rule of Civil Procedure requires that, in order to preserve an issue for judgment as a matter of law pursuant to Rule 50(b), a party must timely move for judgment as a matter of law at the close of the non-moving party's case pursuant to Rule 50(a). Fed. R. Civ. P. 50(b). In addition to requiring that a pre-verdict motion be timely, Rule 50(a) also mandates that a party “specify the judgment sought and the law and the facts” upon which the movant relies. Id. A party's failure to abide by these requirements leaves a reviewing court with a problem of constitutional proportions: “Absent a motion in accordance with Federal Rule of Civil Procedure 50(a), judicial reexamination of the evidence abridges [a party's] right to a trial by jury.” Lightning Lube, Inc. v. Witco Corp., 4 F.3d 1153, 1173 (3d Cir. 1993). Thus, the Third Circuit has stated that a motion for judgment as a matter of law pursuant to Rule 50(b) must be preceded by a Rule 50(a) motion “sufficiently specific to afford the party against whom the motion is directed with an opportunity to cure possible defects in proof which otherwise might make its case legally insufficient.” Id. (citing Acosta v. Honda Motor Co., 717 F.2d 828,



831-32 (3d Cir. 1983)). Such a motion properly places the non-movant and the court on notice of the movant's claims.

## 2. Motion for a New Trial

A court may grant a motion for a new trial pursuant to Rule 59, either upon the motion of a party or *sua sponte*, “for any of the reasons for which new trials have heretofore been granted in actions at law in the courts of the United States.” Fed. R. Civ. P. 59(a). While the Rule is not precise in its language as to the grounds for a new trial, case law has established that a court has the clear authority to order a new trial where, among other things, the verdict was against the weight of the evidence, where the size of the verdict was too large or too small, where new evidence has been discovered, where the judge or any attorney has engaged in misconduct, and where a prejudicial error of law was made. See 11 Charles A. Wright & Arthur R. Miller, Federal Practice and Procedure § 2805, at 38 (1973).

The applicable standard for ordering a new trial where the verdict was against the weight of the evidence differs from the standard for granted a motion for JMOL discussed above. A court should order a new trial when, in its opinion, the verdict is contrary to the “great weight of the evidence.” Roebuck v. Drexel Univ., 852 F.2d 715, 736 (3d Cir. 1988). This is a less stringent standard than that for the grant of a JMOL and a new trial may be granted even when granting a JMOL would be inappropriate. Id. at 715. This is not to say, though, that the threshold for the grant of a new trial on this ground is a low one. As the Third Circuit has said, “new trials because the verdict is against the weight of the evidence are proper only when the record shows that the jury’s verdict resulted in a miscarriage of justice or where the verdict, on the record, cries out to be overturned or shocks our conscience.” Williamson v. Consol. Rail Corp., 926 F.2d 1344, 1353 (3d Cir. 1991); see also Roebuck, 852 F.2d at 736. In so

determining, a court is permitted to consider the credibility of witnesses and to weigh the evidence. Blakey v. Continental Airlines, Inc., 992 F.Supp. 731, 734 (D.N.J. 1998) (citing Hurley v. Atlantic City Police Dep't, 933 F.Supp. 396, 403 (D.N.J. 1996)). A court may not, however, grant a new trial merely because it would have reached a different verdict than the jury.

As discussed above, a party who fails to move for judgment as a matter of law under Rule 50(a) at the close of all evidence wholly waives the right to mount any post-trial attack on sufficiency of evidence grounds. Yohannon v. Keene Corp., 924 F.2d 1255, 1262 (3d Cir. 1991) (citing Gebhardt v. Wilson Freight Forwarding Co., 348 F.2d 129, 132 (3d Cir. 1965)). Where a challenge is made to the weight of the evidence, as opposed to its sufficiency, a court may exercise its discretion and grant a new trial regardless. Greenleaf v. Garlock, Inc., 174 F.3d 352, 365 (3d Cir. 1999).

## **B. The '335 Patent**

The '335 patent, like the '126 and the '827 patents, is directed to a process used in semiconductor fabrication. The fabrication of a semiconductor begins with a thin wafer made of a semiconductor material, the most common of which is silicon. During the fabrication process a large number of microscopic components are layered onto the wafer and a series of electrical interconnections are made between these layers so that the resulting semiconductor chip will function properly. To prevent charged particles from "leaking" between layers, an insulating material called a "dielectric" is used. Because a layer of dielectric is often situated between layers of components that must be electrically linked to each other, it is necessary to remove portions of the dielectric through a multi-step process known as "etching." The result of the etching process is a "contact hole" in the dielectric.

After the etching process is completed, the desired electrical connectivity is achieved by the creation of “contacts” between the layers of components. The first step in creating contacts requires the opening in the dielectric created by the etching process to be filled with a conductive material, such as a metal. Then, an additional layer of metal is deposited over the entire wafer, including the remaining dielectric. Undesired portions of this second metal layer are subsequently removed via the same multi-step etching process mentioned above. This process of creating openings, contacts, and interconnections creates a single layer of a semiconductor wafer; the process may be repeated several times to create a single, electrically interconnected semiconductor wafer with multiple layers. Once all the necessary layers have been formed, the wafer is cut into multiple and identical rectangular chips.

As explained in the Court’s claim construction order, the invention claimed in the ‘335 patent addresses a certain problem that arose in establishing the required contacts between layers. See Doc. No. 63 at 10 (Cl. Construction Order dated May 27, 2003). One of the metals used to fill contact holes in the dielectric is tungsten, which has the advantage of being able to be used in smaller openings, thus creating the ability to make smaller chips. Tungsten, however, does not naturally adhere well to the dielectric. Thus, the ‘335 patent teaches a process by which a “glue layer” is deposited between the dielectric and the tungsten, providing the necessary adherence between the two. In order to maintain the electrical connectivity between layers, the inventors specified that the “glue layer” must be comprised of an electrically conducting material and the precise invention of the ‘335 patent is the use of a conducting nitride, specifically, titanium nitride (TiN), as the primary component of the glue layer.

As stated above, claims 1 through 6 and claim 11 of the ‘335 patent were submitted to the jury on the questions of infringement and invalidity. The jury found that Atmel literally

infringed all the asserted claims of the '335 patent, but that the infringement was not willful and that the asserted claims of the '335 patent were invalid due to anticipation.

1. IBM Process B was a separate factual, not a legal, basis for the jury's finding of the anticipation of the asserted claims of the '335 patent and Agere's motion for JMOL based on deficiencies in that factual basis must fail.

The only proper Rule 50 motion preserved by Agere at the close of the evidence with respect to the '335 patent was for a judgment that IBM Processes B and C were not prior art and therefore insufficient to show that the '335 patent was invalid as anticipated. 3/18/05 Tr. at 128. Agere has renewed its motion on this point with respect to IBM Process B, arguing that, if the Court finds that Process B is not prior art to the '335 patent as a matter of law, that it must order a new trial on the issue of anticipation, because the jury returned only a general verdict of anticipation without specifying which prior art reference offered by Atmel at trial it was basing that verdict upon.

At trial, Atmel offered multiple pieces of prior art, including IBM Process B, to support its contention that the asserted claims of the '335 patent were invalid as anticipated. The jury returned a verdict of invalidity with respect to the asserted claims of the '335 patent, but did not identify which prior art reference or references it believed invalidated the claims. Agere argues that, because IBM Process B was presented by Atmel as a separate legal theory of anticipation, the jury's verdict on anticipation cannot stand if Atmel failed to prove that IBM Process B was prior art because "[w]here a jury has returned a general verdict and one theory of liability is not sustained by the evidence or legally sound, the verdict cannot stand because the court cannot determine whether the jury based its verdict on an improper ground." Wilburn v. Maritrans GP Inc., 139 F.3d 350, 361 (3d Cir. 1998).

Even if IBM Process B does not qualify as “prior art” as defined by Congress and the courts, Agere’s motion must fail. The Federal Circuit recently confronted an identical request to Agere’s in Northpoint Technology, Ltd. v. MDS America, Inc., 2005 WL 1514258 (June 28, 2005). In that case, the defendants relied on five different prior art references and plaintiff, in its post-trial motion, claimed that a failure of proof with respect to one of the prior art references necessitated a new trial. The Federal Circuit squarely rejected this contention because the five prior art references were actually separate factual bases for the jury to consider with regard to defendant’s overall theory of anticipation. Id. at \*9.

Where a jury’s general verdict rests on several different factual grounds, and one of those grounds is later shown to be inadequate, a reviewing court should let the jury verdict stand by assuming that the jury convicted on the factually sufficient theory. See United States v. Griffin, 502 U.S. 46 (1991). Though a court presumes that a jury is able to distinguish factually sufficient evidence from factually insufficient evidence, it cannot presume that the jury has the competence to distinguish accurate statements of law from factually inaccurate ones. Id. at 59. Though the Supreme Court’s holding in Griffin took place in the context of a criminal appeal, as the Federal Circuit recognized in Northpoint Technology, that principle is equally applicable in the civil context. Northpoint Tech., 2005 WL 1514258 at \*9-10 (citing Walther v. Lone Star Gas Co., 952 F.2d 119, 126 (5th Cir. 1992); Sandberg v. Va. Bankshares, Inc., 891 F.2d 1112, 1122 (4th Cir. 1989), rev’d on other grounds, 501 U.S. 1081 (1991); McCord v. Maguire, 873 F.2d 1271 (9th Cir. 1989); Baumler v. State Farm Mut. Auto. Ins., 493 F.2d 130, 134 (9th Cir. 1974)).

As in Northpoint, Agere argues only that one of the factual bases for the jury’s verdict of anticipation was insufficient. The Court is bound to presume, however, that the jury’s verdict rests on a factually sufficient ground. As such, the Court rejects Agere’s contention that the

jury's finding of invalidity must be set aside because Atmel failed to offer sufficient evidence that IBM Process B anticipated the '335 patent.

2. The jury's finding that the asserted claims of the '335 patent are anticipated by the prior art is supported by the great weight of the evidence.

Agere argues that the jury's finding that claims 4 and 5 of the '335 patent are anticipated is against the great weight of the evidence, because Atmel failed to produce any evidence at trial that a single prior art reference discloses each and every limitation of the '335 patent. Both of these claims are dependent upon claim 1, the sole independent claim of the '335 patent. The relevant claim language is as follows:

1. A method of fabricating an integrated circuit comprising the steps of:  
 patterning a dielectric layer to form holes which expose the underlying material,  
 said exposed underlying material comprises an electrically conducting material;  
 depositing a glue layer covering said dielectric and said exposed underlying  
 material;  
 depositing a tungsten layer by chemical vapor deposition, said tungsten layer  
 covering said glue layer on said dielectric and said exposed material;  
 CHARACTERIZED IN THAT said glue layer comprises at least one member  
 selected from the group consisting of conducting nitrides.

....

4. A method as recited in claim 1 further comprising etching said tungsten and  
 said glue layer to form a planar surface of said dielectric and said tungsten in said  
 hole, said tungsten being etched before said glue layer.

5. A method as recited in claim 4 in which said conducting nitride consists  
 essentially of TiN.

'335 Patent at col. 5:22 through col. 6:7; col. 6:11 through col. 6:16.

As stated above, under 35 U.S.C. § 282, patents are presumed valid. 35 U.S.C. § 282;  
see e.g., Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530 (Fed.Cir. 1983). The party claiming a  
 patent's invalidity must first establish a prima facie case of invalidity and must carry the burden  
 of persuasion until the final decision. Id. at 1534. Such a party bears an especially heavy burden  
 because of the deference given to decisions of the patent examiner. Am. Hoist & Derrick Co. v.

Sowa & Sons, 725 F.2d 1350, 1359, (Fed. Cir.), cert. denied, 469 U.S. 821 (1984). One method of establishing that a patent is invalid is to show that it was anticipated by the prior art.

Anticipation is the disclosure in the prior art of something substantially identical to the claimed invention. 35 U.S.C. § 102(b). A patent claim is anticipated in the prior art “only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” Verdegaal Bros., Inc. v. Union Oil Co., 814 F.2d 628, 631 (Fed. Cir.), cert. denied, 484 U.S. 827 (1987); see also Hoover Group, Inc. v. Custom Metalcraft, 66 F.3d 299, 302 (Fed. Cir. 1995). Proving anticipation is therefore a rigorous task – prior art that discloses “almost” the same elements and limitations of a claimed invention, though it may yet render a claim invalid under another theory, does not render the claim invalid for anticipation. Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 1548 (Fed. Cir. 1983). The question of whether a prior art reference anticipates a claimed invention is one of fact. Advanced Display Sys., Inc. v. Kent State Univ., 212 F.3d 1272, 1281 (Fed. Cir. 2000).

At trial, Atmel bore the burden of showing invalidity by clear and convincing evidence. It introduced seven references that it claimed rendered the asserted claims of the ‘335 patent invalid – IBM Processes A and B, the Suguro reference, the Blewer reference, the Asahina reference, the Thomas ‘004 patent, and the Thomas ‘071 patent. In its response to Agere’s motion, Atmel relies upon IBM Process A and the Suguro reference as proof that the weight of the evidence was sufficient for a jury finding of anticipation.

*a. The weight of the evidence supports a finding that IBM Process A claims 4 and 5 of the ‘335 patent are anticipated by IBM Process A.*

Agere argues that Atmel’s proofs with respect to IBM Process A were deficient because it does not include the step of “depositing a glue layer . . . compris[ing] at least one member selected from the group consisting of conducting nitrides” as required by claims 1, 4 and 5 of the

'335 patent. Agere cites to the testimony of Drs. Rana, Cronin, and Reif in support of its contention that the great weight of the evidence and testimony at trial established that IBM Process A did not anticipate the '335 patent because Process A deposited a titanium layer, which was then annealed to the titanium layer to form titanium nitride. Agere contends that a person in the ordinary skill in the art would have understood the term "depositing" as used in the '335 patent not to encompass annealing and that this contention is supported by the weight of the evidence introduced at trial.

There is no question that IBM Process A involves the formation of a layer of titanium nitride to act as an adhesive between the dielectric and the substrate; the distinction drawn by Agere has to do with how that layer of titanium nitride is created. According to internal IBM documents, IBM Process A uses a "thermal annealed [titanium nitride] on top of pure [titanium]," meaning that IBM Process A used a two-step process in which a layer of titanium was deposited, then reacted with a gas to form an overlying layer of titanium nitride. Def. Tr. Ex. 1111 at 3; Cronin 3/15/05 Tr. at 91. In contrast, the '335 patent uses a single step deposition of titanium nitride.

Though the techniques used by the two sets of inventors differ, the evidence at trial clearly supports a finding that the difference was not meaningful to an analysis of anticipation, as a reasonable jury could well have found annealing is one category of "depositing," as that term is used in the '335 patent. Dr. Rana testified that annealing is "the process converting titanium to titanium nitride" by using a nitrogen gas. Rana 3/15/05 Tr. at 23. He testified that his invention "talked about titanium nitride" and that annealing is one of several ways "of getting titanium nitride . . . [annealing] is one, one of the ways." *Id.* at 23-24. He testified that the critical part of his invention was "getting titanium nitride at the top before you deposit tungsten"



and that IBM Process A accomplished that task by annealing. *Id.* at 24. Dr. Rana confirmed this testimony in describing certain testing he had performed in developing the titanium nitride glue layer, which used an annealing process, while Dr. Chittipeddi, the co-inventor of the '126 patent also confirmed that, under certain conditions, one method of depositing titanium nitride was to deposit titanium, then anneal it. *Id.* at 36; Chittipeddi 3/2/05 Tr. at 177. Lastly, Atmel's expert Dr. Thomas walked the jury through IBM Process A to demonstrate how that invention met each and every limitation of claim 1 of the '335 patent, including the step in which the titanium nitride glue layer is deposited. Thomas 3/16/05 Tr. at 10-12. The only testimony at trial regarding annealing that is contrary to that cited above was the testimony of Agere's expert, Dr. Reif. Dr. Reif testified that, in his opinion, annealing is not equivalent to depositing, because depositing involves the creation of a layer that did not previously exist, while annealing merely transforms the surface of an existing layer into something else without the addition of another layer. Reif 3/17/05 Tr. at 175-78. There is no doubt that there was conflicting evidence on the issue of whether annealing is the equivalent of depositing; however, the Court cannot say that the jury's resolution of this question in Atmel's favor was against the great weight of the evidence. The jury's finding has adequate support in the trial record and must stand.

Agere further argues that the IBM Process A cannot anticipate the '335 patent because it does not combine the steps recorded in claims 4 and 5 of "depositing a glue layer . . . compris[ing] at least one member selected from the group of conducting nitrides" and "etching said tungsten and said glue layer to form a planar surface of said dielectric and said tungsten in said hole." Agere argues that the only testimony that a planarization step is implicitly present in IBM Process A was from Dr. Cronin, one of the IBM inventors who worked on Process A, and that such testimony, uncorroborated, is insufficient to support a jury finding of anticipation.

Agere is correct that Dr. Cronin's testimony must be corroborated in order for this Court to find that Atmel has met its burden of proving anticipation by clear and convincing evidence. A party seeking to prove conception via the oral testimony of an alleged prior inventor must proffer evidence corroborating that testimony. See, e.g., Singh v. Brake, 222 F.3d 1362, 1367 (Fed. Cir. 2000). Corroborating evidence "may consist of testimony of a witness, other than an inventor, to the actual reduction to practice or it may consist of evidence of surrounding facts and circumstances independent of information received from the inventor." Hahn v. Wong, 892 F.2d 1028, 1032-33 (Fed. Cir. 1989) (quoting Reese v. Hurst v. Wiewiorowski, 661 F.2d 1222, 1225 (C.C.P.A. 1981)). As the Federal Circuit has explained:

[A] "rule of reason" analysis is applied to determine whether an inventor's testimony regarding reduction to practice has been sufficiently corroborated. The rule requires an evaluation of all pertinent evidence when determining the credibility of an inventor's testimony. In order to corroborate a reduction to practice, it is not necessary to produce an actual over-the-shoulder observer. Rather, sufficient circumstantial evidence of an independent nature can satisfy the corroboration requirement.

Cooper v. Goldfarb, 154 F.3d 1321, 1330 (Fed. Cir. 1998) (internal citations omitted).

At trial, Atmel offered the above-described IBM invention disclosure statement dated October 22, 1985 to corroborate Dr. Cronin's testimony, as well as Trial Exhibit 1120. The IBM invention disclosure statement clearly does not expressly reflect the etching of the tungsten plug. Cronin 3/15/05 Tr. at 97. Thus, the only available document to Atmel for corroboration purposes is Exhibit 1120, which describes the IBM process of record ("POR") as of February 5, 1986; Mr. Cronin testified that the purpose of the document was to memorialize the current process for manufacturing semiconductor chips and to see if the process could be further streamlined and refined. Def. Tr. Ex. 1120; Cronin 3/15/05 Tr. at 120. The POR reflects that IBM Process A was being used as part of the POR; it also reflects that the POR contains a step described as "W-

blanket etch,” which follows the step in which tungsten is deposited on sputtered titanium. Def. Tr. Ex. 1120. Dr. Cronin testified that this represented an etch step in which the tungsten was removed all the way back to the surface of the dielectric, leaving the tungsten and titanium in the contact holes flush with the surface of the dielectric. Cronin 3/15/05 Tr. at 134. The Court finds that the documentary evidence introduced at trial is sufficient to corroborate Dr. Cronin’s testimony under the “rule of reason” standard as articulated by the Federal Circuit.

For all the foregoing reasons, the Court finds that a new trial is not warranted on the grounds that the weight of the evidence does not support the jury’s finding on the issue of the anticipation of the ‘335 patent with respect to IBM Process A. First, the jury heard multiple skilled and credible witnesses testify to the issue of whether thermal annealing, as described in IBM Process A, is equivalent to the way that “depositing” is used in the ‘335 patent. Second, the Court finds that Dr. Cronin’s testimony on the point of whether Process A contained a step in which the tungsten was etched back to create a planar surface to be sufficiently corroborated. The Court cannot say, after reviewing the testimony and the accompanying documentary evidence that the jury’s conclusion that the asserted claims of the ‘335 patent was anticipated by IBM Process A was against the great weight of the evidence.

*a. The weight of the evidence supports a finding that Suguro anticipates claims 4 and 5 of the ‘335 patent.*

As stated above, where a jury’s general verdict rests on several different factual grounds, and some of those grounds are sufficient to support the jury’s findings, but others are not, a reviewing court should let the jury verdict stand by assuming that the jury convicted on the factually sufficient theory or theories. See United States v. Griffin, 502 U.S. 46 (1991). The Court will nevertheless address the parties’ arguments on the Suguro reference as an alternative ground for a finding of anticipation. Agere argues that Suguro cannot anticipate because it does

not disclose the formation of a conducting nitride glue layer between tungsten and the dielectric and because it does not disclose the formation of a tungsten plug over a conducting nitride glue layer. The Court finds that there was sufficient evidence at trial that Suguro does indeed disclose those limitations of claims 4 and 5 of the '335 patent and that the jury's determination of anticipation also rests comfortably on that reference as well.

Claim 4 of the '335 patent requires that the tungsten overlying the glue layer be etched back to form a planar surface with the dielectric. Suguro clearly depicts, in figure 1, the process by which the contact hole is filled by tungsten, including the step in which the tungsten is etched back to form a tungsten plug. *Id.* at 2, Figure 1. Claim 5 of the '335 patent requires that the glue layer contain a conducting nitride, specifically TiN, which Dr. Reif testified was the crucial invention of the '335 patent. Reif 3/3/05 Tr. at 22. Atmel presented evidence at trial that Suguro discloses "a novel W/TiN/TiSi<sub>2</sub> structure" for use in the manufacture of semiconductor chips; this structure clearly contains TiN, the conducting nitride specifically claimed as the invention of the '335 patent. In Suguro, this structure is achieved by sputtering of titanium nitride (TiN) and titanium disilicide (TiSi<sub>2</sub>) on top of silicon, then filling the remainder of the contact hole with tungsten by means of chemical vapor deposition. Def.'s Opp'n, Ex. 9 at 1. The invention discloses that the TiN/TiSi<sub>2</sub> layer is used to prevent the subsequently annealed tungsten from forming a silicide, which is a possibility when tungsten is reacted with silicon at certain temperatures. *Id.* at 2.

At trial, Dr. Thomas testified about the steps found in Suguro outlined above, describing each step in response to a question about which other art, at or prior to the time the '335 patent was filed, was teaching the use of titanium nitride layers under tungsten and between tungsten and the dielectric. Thomas 3/16/05 Tr. at 63-64. Dr. Reif attempted to draw a distinction

between the process described in Suguro and that disclosed in the '335 patent by offering testimony as to why, in his opinion, the TiN/ TiSi<sub>2</sub> layer might only exists in the contact hole and not both in the contact hole and over the dielectric, as is required by the '335 patent. Reif 3/17/05 Tr. at 183. Dr. Reif's testimony, however, was merely hypothetical and does not compel the conclusion that the overwhelming weight of the evidence was that Suguro did not anticipate. Because Atmel produced sufficient evidence at trial that Suguro discloses each and every limitation of the asserted claims of the '335 patent, Agere's motion for a new trial on the issue of the anticipation of the '335 patent is denied.

3. Atmel's motion for JMOL on the obviousness of the asserted claims of the '335 patent must be granted, as that verdict is not supported by the evidence produced at trial.

Both parties agree that the jury's verdict that the asserted claims of the '335 patent are invalid as anticipated is irreconcilable with its verdict that the asserted claims of the '335 patent are not invalid for obviousness. The Federal Circuit has been clear that jury verdicts that patent claims are anticipated but not obvious are inconsistent with the principle that "anticipation is the epitome of obviousness." Structural Rubber Prods. Co. v. Park Rubber Co., 749 F.2d 707, 716 (Fed. Cir. 2003) (quoting In re Fracalossi, 681 F.2d 792, 794 (C.C.P.A. 1982)). Agere therefore argues that a new trial is mandated on the questions of anticipation and obviousness. For its part, Atmel moves for a JMOL on obviousness based on the jury's finding that the asserted claims were anticipated, as well as based on the substantive evidence of obviousness it introduced at trial.

"Inconsistent jury verdicts are an unfortunate fact of life in law, and should not, in and of themselves, be used to overturn otherwise valid verdicts." Boyanowski v. Capital Area Intermediate Unit, 215 F.3d 396, 407 (3d Cir. 2000). However, the Third Circuit has been clear

that a Court may not simply direct a verdict for one party on one claim based solely on its inconsistency with the jury's verdict on another claim. Mosley v. Wilson, 102 F. 3d 85, 90-91 (3d Cir. 1996). Indeed, in the Third Circuit, a fundamental inconsistency among jury verdicts is grounds for a new trial. Riley v. K-Mart Corp., 864 F.2d 1049, 1054 (3d Cir. 1988); Malley-Duff & Assocs., Inc. v. Crown Life Ins. Co., 734 F.2d 133, 145 (3d Cir. 1984). However, the Federal Circuit, in applying Third Circuit precedent on this issue, has also said that "if a jury returns a verdict that contains portions that may be inconsistent, the law does not state that the verdict must be thrown out immediately and a new trial ordered. Instead, the district court is first instructed to carefully review the different portions of the jury's verdict for a means to reconcile them." Mycogen Plant Sci. v. Monsanto Co., 243 F.3d 1316, 1326 (Fed. Cir. 2001). Thus, the Court will first address Atmel's motion for JMOL on the issue of obviousness, in an attempt to see whether the Court can indeed reconcile the inconsistent verdicts. See id. At 1326 (stating that all motions for JMOL should be considered prior to revisiting the question of inconsistent verdicts). If, however, the trial record contains evidence from which a reasonable jury could have concluded that the asserted claims of the '335 patent were anticipated and that the asserted claims of the '335 patent were not obvious, a new trial must be granted. See Riley, 864 F.2d at 1054 (stating a new trial is warranted where "there is no way of judging which [verdict], if either, is the more reasonable").

Thus, the Court must review the jury's verdict of non-obviousness to see whether that verdict is without a legally sufficient evidentiary basis for the jury's factual findings as to (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) any objective evidence of nonobviousness. Graham v. John Deere Co., 383 U.S. 1, 17 (1966). The jury's finding of non-obviousness

applies to claims 1 through 6 and claim 11 of the '335 patent, which obviously includes the claim language quoted above. For ease of analysis, the Court will reproduce the asserted claims in their entirety here:

1. A method of fabricating an integrated circuit comprising the steps of: patterning a dielectric layer to form holes which expose the underlying material, said exposed underlying material comprises an electrically conducting material; depositing a glue layer covering said dielectric and said exposed underlying material; depositing a tungsten layer by chemical vapor deposition, said tungsten layer covering said glue layer on said dielectric and said exposed material; CHARACTERIZED IN THAT said glue layer comprises at least one member selected from the group consisting of conducting nitrides.
2. A method as recited in claim 1 in which said material comprises said silicon surface.
3. A method as recited in claim 1 in which said material comprises a metallic silicide.
4. A method as recited in claim 1 further comprising etching said tungsten and said glue layer to form a planar surface of said dielectric and said tungsten in said hole, said tungsten being etched before said glue layer.
5. A method as recited in claim 4 in which said conducting nitride consists essentially of TiN.
6. A method as recited in claim 1 in which said dielectric comprises silicon dioxide.
- ...
11. A method as recited in claim 1 further comprising the step of patterning said tungsten and said glue layer.

'335 Patent at col. 5:22 through col. 6:18; col. 6:28 through col. 6:29. The Court finds that an application of the Graham test to the evidence presented at trial leads to the legal conclusion that the '335 patent would have been obvious to a person have ordinary skill in the manufacture of semiconductors at the time the invention was made.

The problem faced by the inventors of the '335 patent was the lack of adhesion between the dielectric and tungsten; the solution embodied in that patent is the use of a "glue layer" comprised of a conducting nitride. The inventors noted, in their patent, that the use of a glue layer composed of "elemental metals, such as Ti, and metallic silicides, such as WSi<sub>2</sub>" had previously been proposed as a solution to the problem. '335 patent, col. 2:33 through 2:36.

Thus, a person of ordinary skill in the art would have known to try a glue layer to solve the adhesion problem – Agere’s invention was to construct that glue layer using a conducting nitride, such as TiN. The question, then, is whether Atmel presented evidence of prior art that would lead to the presumption that a person of ordinary skill in the art would have known to use a glue layer containing primarily TiN to solve the adhesion problem.

As stated above, claim 1 is the only dependent claim of the ‘335 patent. Atmel claims that it produced clear and convincing evidence that each of the limitations of claim 1 were within the scope and content of the prior art, including IBM Processes A and B, the Suguro reference, the Blewer reference, the Asahina reference, the Thomas ‘004 patent, and the Thomas ‘071 patent. Agere argues that each of these references fails to disclose at least one element of claim 1, that Atmel failed to produce clear and convincing evidence that any combination of these prior art references discloses all the limitations of claim 1, and that the prior art teaches away from the ‘335 patent.

Claim 1 requires the use of a conducting nitride layer between a patterned dielectric and CVD tungsten; dependent Claim 5 requires that the conducting nitride layer consist essentially of TiN. At trial, Atmel presented evidence that, by at least October 1985, IBM had noted that “LPCVD tungsten requires an adhesion layer to adhere to [an insulating layer].” Tr. Ex. 1111. As a result, IBM developed Processes A and B, which taught the use of two new structures, each of which contained a conducting nitride and was primarily comprised of TiN – W/TiN (Process B) and W/TiN/Ti (Process A) – to improve adhesion and contact resistance in the manufacture of semiconductor chips. Tr. Ex. 1111. The main difference between Process A and the ‘335 patent is the use of an annealing process for the deposition of TiN/Ti. However, as the Court found above, the evidence at trial showed that a person of ordinary skill in the art would have



understood annealing to be equivalent to depositing, as that term is used in the ‘335 patent; therefore, it would have been obvious for a person of ordinary skill in the art to try an alternative method of depositing the TiN. Even assuming that the difference was a material one, as Atmel points out, the evidence of a motivation to combine can be found in the IBM invention disclosure itself, as Process B describes a sputtering, rather than an annealing step, for the deposition of a titanium nitride layer to achieve the same result – better adhesion in the formation of semiconductor chips. The IBM invention statement itself notes that both structures “resolve[] the previous adhesion . . . problems.” Tr. Ex. 1111. A person of ordinary skill, then, looking at IBM Processes A and B would have understood that the adhesion problem could have been solved by the use of TiN as a glue layer and that the TiN glue layer could be deposited by either an annealing step or a sputtering step. This evidence, along with other prior art introduced at trial,<sup>4</sup> clearly establishes that persons of ordinary skill in the art, prior to the filing of the ‘335 patent, had identified the use of a conducting nitride comprised primarily of TiN in a glue layer to solve the issue of properly adhering the tungsten and the dielectric in semiconductor manufacturing.

Thus, an examination of the scope and content of Processes A and B, the differences between Processes A and B and the claims 1 and 5 of the ‘335 patent, and the level of ordinary skill in the art at the time the ‘335 patent was filed, leads the Court to find that no reasonable jury could have found that the IBM Processes does not render claim 1 and 5 of the ‘335 patent

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<sup>4</sup> Suguro disclosed, in August 1986, the use of a TiSi<sub>2</sub>/TiN layer between tungsten and a dielectric, with the tungsten being deposited by CVD. 3/17/05 Tr. at 182. The Thomas ‘004 patent, which was filed in April of 1984, taught the use of a TiN layer, deposited into the contact holes and over the remaining dielectric, which was then covered by tungsten. Tr. Ex. 1166; 3/16/05 Tr. at 30-37. Though the ‘004 patent does not teach the deposition of tungsten by CVD, as is required by the ‘335 patent, Dr. Thomas offered uncontroverted testimony that a person of ordinary skill in the art, at the time the ‘335 patent was filed, would have known to deposit tungsten by CVD, as it was “the dominant tungsten deposition technique at that time.” 3/16/05 Tr. at 37. In addition, an article published in November 1986 stated that “titanium nitride . . . [has] been found effective” as an adhesion-promoting layer. Def.’s Tr. Ex. 1544; Thomas 3/16/05 Tr. at 69.

obvious. The question remains, however, whether claims 2 through 4, claims 6 and 11 are likewise obvious in light of the prior art and whether Atmel presented evidence of a motivation to combine the variations laid out in those claims with the use of a conducting nitride layer between a patterned dielectric and CVD tungsten.

With respect to claims 2, 3, and 6, Agere's own expert, testified that, at the time the '335 patent was invented, persons of ordinary skill in the art were exploring the use of a glue layer over silicon surfaces, specifically over metallic silicides, though he was not one hundred percent sure about the latter statement. Reif 3/3/05 Tr. at 133; see also Cronin Tr. at 67-68 (stating that IBM was using silicon substrates in mid-1983). Dr. Thomas testified that IBM Process A used a metallic silicide, which confirms Dr. Reif's recollection of the use of metallic silicides. 3/16/05 Tr. at 13-14. As to claim 6, Dr. Reif further testified that engineers were using silicon dioxides as a dielectric material long before the filing of the '335 patent; this is confirmed by IBM Process A, which uses layer containing silicon dioxide known as "BPSG" or "boro-phosphorous silicate glass." Reif 3/3/05 Tr. at 133; Thomas 3/16/05 Tr. at 14; Cronin 3/15/05 Tr. at 93. With respect to Claim 4, Dr. Thomas testified, in his explanation of the IBM POR incorporating Process A, that people within the industry were etching back tungsten to form a planar surface after tungsten was deposited in the contact holes in the dielectric. Thomas 3/16/05 Tr. at 14-16. Thomas 3/16/05 Tr. at 20-21. As discussed above, Dr. Cronin testified to the IBM POR as of October 1986, which incorporated IBM Process A and which featured a step referred to as "W blanket etch," referring to the process by which the CVD tungsten is removed all the way back to the surface of the BPSG dielectric. Tr. Ex. 1120; Cronin 3/15/05 Tr. at 122-23. Lastly, Claim 11 requires a patterning of the tungsten and glue layer. Dr. Thomas testified that persons of ordinary skill in the art were patterning the tungsten and the underlying glue layer at the time the

‘335 patent was invented; this testimony is buttressed by an article published in November 1986 by Robert S. Blewer, to which Dr. Thomas testified, and which summarized the work being done in the semiconductor manufacturing industry at the time. Thomas 3/16/05 Tr. at 73. The Blewer article discusses not only the patterning of tungsten, but also the use of TiN an adhesion layer (as required by Claim 1) over a silicon substrate (as required by Claim 2), but also the etching of tungsten (as required by Claims 4 and 5). Def.’s Tr. Ex. 1544 at 125; Thomas 3/16/05 Tr. at 68-69.

The above evidence of the obviousness of the dependent claims of the ‘335 patent is not exhaustive, but is illustrative of the fact that the evidence at trial overwhelmingly pointed to the fact that the limitations described in those dependent claims were well known to those of ordinary skill in the art at the time the ‘335 patent was filed. Moreover, the testimony and evidence presented at trial was that persons of ordinary skill in the industry were working diligently towards finding a solution to the dielectric-CVD tungsten adhesion problem. Reif 3/17/05 Tr. at 186. Thus, if the use of TiN as an adhesive was known to a person of ordinary skill in the art, and the remainder of the steps recited in the ‘335 patent were known to one of ordinary skill in the art, such a person would have been clearly motivated, as the inventors at IBM actually were motivated, to meld that knowledge into a manufacturing process incorporating TiN and the steps articulated in claims 2 through 6 and 11.

The last factor in the Graham analysis is the presence of any objective evidence of nonobviousness, which Agere argues trumps the evidence of obviousness detailed above. Specifically, Agere points to the long-felt need for its invention and industry acceptance and licensing of its invention as objective evidence that could lead a jury to properly determine that the ‘335 patent was not obvious at the time of its invention. The Federal Circuit has stated that a

“trial court may conclude that a patent claim is obvious, even in the light of strong objective evidence tending to show non-obviousness.” Motorola, Inc. v. Interdigital Tech. Corp., 121 F.3d 1461, 1472 (Fed. Cir. ) (citing Newell Cos v. Kenney Mfg. Co., 864 F.2d 757, 768-69 (Fed. Cir. 1988)). There is no doubt that Agere has enjoyed substantial commercial success in licensing its invention. Reif 3/17/05 Tr. at 186; DeBlasi 3/7/05 61-65. The Court, however, finds that the overwhelming evidence of obviousness put forward by Agere negates the effect of this evidence of commercial success under the Graham test. See, e.g., EWP Corp. v. Reliance Universal, Inc., 755 F.2d 898, 907-08 (Fed. Cir. 1985) (Davis, J. concurring) (stating that a strong case of obviousness based on the prior art may overcome evidence of a strongly felt need in the industry and a wildly successful licensing program of the patented technology).

Atmel has met the heavy burden placed upon a party who seeks a JMOL on an issue as to which it bears the ultimate burden of proof. The evidence presented on the obviousness of the ‘335 patent at trial is indeed overwhelming and leads to no reasonable conclusion other than that finding the asserted claims of the ‘335 patent invalid as obvious. This finding resolves the inherent conflict between the jury’s findings that the asserted claims were anticipated but not obvious. The Court therefore denies Agere’s motion for a new trial on the obviousness of the ‘335 patent. Agere’s motion for JMOL on the obviousness of the ‘335 patent for obviousness is granted.

4. The jury’s verdict of the infringement of the asserted claims of the ‘335 patent has a legally sufficient evidentiary basis.

Atmel argues that Agere failed to carry its burden in showing, by a preponderance of the evidence, that its accused processes infringed claims 4 and 5 of the ‘335 patent. Specifically, Atmel argues that Agere failed to show that the Atmel processes contained a step in which the tungsten and the glue layer are etched “to form a planar surface” of the dielectric and the

tungsten that has, at that point, been formed in the contact hole. Atmel argues that the testimony of Dr. Reif that Atmel's processes result in surfaces that are only "substantially planar" is not sufficient to meet Agere's burden of proving infringement under either a theory of literal infringement or infringement under the doctrine of equivalents.

Determining infringement is a two-step process. First, a court must first correctly construe the asserted claims; second, the court must compare the properly construed claims to the allegedly infringing devices, systems, or methods. Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp., 149 F.3d 1309, 1315 (Fed. Cir.1998). With respect to the first step, long before trial, the parties stipulated to the following construction for the term "planar," as it is used in the '335 claim language: "substantially two dimensional or flat." Doc. No. 46 at 2 (Sec. Rev. Jt. Statement of Disputed Cl. Terms dated Dec. 6, 2002). Thus, the question before the court is whether there was sufficient evidence before the jury such that their comparison of claims 4 and 5 of the '335 patent, using the parties' construction of the term "planar," with Atmel's accused processes could properly result in a finding of infringement.

At trial, Dr. Reif first testified that perfect planarity of the dielectric and the tungsten plug cannot be expected within the context of semiconductor fabrication because "nothing is perfectly flat" in manufacturing. Reif 3/3/05 Tr. at 77. This reality is reflected in the parties' agreement to include the modifier "substantially" in their definition of the term "planar." Further, Dr. Reif testified repeatedly that the accused Atmel plasma and chemical mechanical polishing etching processes result in a surface that meets the parties' agreed-upon definition of "planar." Reif 3/3/05 Tr. at 73-74, 76-77. In addition, Atmel's expert, Dr. Thomas, also testified that a particular tungsten plug of Atmel's met the Court's definition of planar. Thomas 3/16/05 Tr. at 209-10.

Given the construction of the term “planar” agreed upon by the parties and the above testimony and evidence, the Court finds that Agere produced the “minimum quantum of evidence from which a jury might reasonably afford relief” on the question of the infringement of claims 4 and 5 of the ‘335 patent. The parties agreed that the claims do not require perfect planarity and Agere presented sufficient testimony on the planarity resulting from Agere’s processes to show that those processes infringed the claims as construed. As such, Atmel’s motion for JMOL on the issue of infringement is denied.

**C. ‘269 Patent**

After a semiconductor chip is fabricated, it must be “packaged” to protect it from damage and to establish a connection between the chip circuitry and the device in which it is ultimately used. Doc. No. 63 at 47-48 (Cl. Construction Order dated May 27, 2003). The ‘269 patent describes a package in which a surface known as a “paddle” is connected to an “external mounting frame” by “paddle support arms.” The semiconductor chip is mounted onto the paddle, which is pressed down to mount the chip. During this process, the pressure from the downsetting process may create an undesirable deformation in the paddle support arms. The ‘269 patent claims the invention of a “deformation absorbing member” located on the paddle support arms; these deformation absorbing members act to minimize the deformation that occurs during downsetting.

Claims 6 and 9 of the ‘269 patent were submitted to the jury on the questions of validity and infringement; the jury returned a verdict of non-infringement and invalidity due to anticipation. Claims 6 and 9 set forth:

6. A semiconductor integrated circuit package comprising:  
a semiconductor integrated circuit chip;  
a paddle on which said chip is mounted;

a plurality of paddle support arms, said paddle being connected to said paddle support arms;  
 a plurality of fingers;  
 electrical connections from said chip to said fingers;  
 CHARACTERIZED IN THAT said paddle support arms comprise a deformation absorbing member, said paddle being depressed with respect to at least a portion of said fingers, said deformation absorbing member localizing deformation during paddle downsetting and maintaining desired physical characteristics.

9. A semiconductor integrated circuit package as recited in claim 6 in which deformation absorbing member comprises an annular member.

'269 Patent at col. 4:13 through col. 4:36.

1. The jury's verdict that claim 6 of the '269 patent is invalid is based on legally insufficient evidence.

Agere has moved for JMOL on the issue of whether claim 6 of '269 patent is invalid as anticipated in light of the Sano reference. Agere argues that there was insufficient evidence at trial that the prior art discloses each and every limitation of claim 6 and that Dr. Prince's testimony on Sano was merely conclusory and not an appropriate basis for a finding of anticipation. Atmel argues that the testimony of Dr. Prince, in combination with the contents of the Sano reference, and the prosecution history of the '269 patent, was sufficient to overcome the statutory presumption of validity.

Atmel introduced only one piece of prior art against the '269 patent at trial – the Sano patent application ("Sano") dated July 23, 1982. The Sano reference was introduced during the testimony of Atmel's expert, Dr. Prince, who testified that the inventors of the '269 patent disclosed the existence of Sano to the examiner during the patent prosecution of the '269 patent. 3/10/05 Tr. at 193. During a discussion of the distinctions that the inventors drew for the patent office between their invention and the Sano reference, Dr. Prince testified that Sano showed a process in which a paddle is downset and pointed the jury to Figure 1 of the Sano reference, in which he identified the figures that corresponded to the '269 patent's paddle, paddle support

arms, fingers, and deformation absorbing members. *Id.* at 193-95. Dr. Prince further testified that the main difference that the inventors of the ‘269 patent saw between their invention and Sano was the alleged presence of clamping in the Sano process, which the inventors claimed isolated the paddle support arms from the downsetting process, which the inventors argued meant that the paddle support arm did not contain a deformation absorbing member. *Id.* at 194-95. On cross-examination, Dr. Prince further identified the deformation absorbing members in Sano and stated that it did not contain a reference to clamping. *Id.* at 212, 215.

Taking all of the above evidence in the light most favorable to Atmel, the Court finds that Agere’s motion for JMOL must be denied. Given the Sano reference itself, and Dr. Prince’s testimony on that reference, the jury had sufficient evidence before it to find that Sano disclosed each and every limitation of claim 6 the ‘269 patent and that claim 6 was invalid as anticipated.

2. The jury’s verdict of the anticipation supported by the weight of the evidence.

Agere has moved this Court to find that the jury’s verdict that the ‘269 patent was anticipated was against the weight of the evidence introduced at trial. Agere claims that the testimony offered by Atmel’s expert, Dr. Prince, was insufficient to overcome the strong statutory presumption of validity, especially in light of the fact that the Sano reference was examined by the PTO during the prosecution of the ‘269 patent. Atmel relies upon the same proofs cited above in the Court’s discussion of Agere’s motion for JMOL on this same issue.

The Court’s examination on the evidence presented at trial on the issue of the ‘269 patent’s invalidity, as discussed above, leads it to conclude that the jury’s verdict does not “shock the conscience” or result in a miscarriage of justice. Moreover, the jury’s verdict on the issue of Atmel’s non-infringement of the ‘269 patent, as Atmel details in its brief, is well-supported by the record, particularly the testimony of Dr. Prince on the use of clamping in



Atmel's processes and his testimony, reiterated by Atmel employee Julius Kovats, that the shape of the accused Atmel structures is not consistent with use as a deformation absorbing member. See Def.'s Opp'n at 86-88 (Doc. Nos. 347, 349). Thus, even if the jury's verdict on the issue of anticipation had been against the weight of the evidence, a new trial on that issue, without infringing conduct by Atmel, would be an empty exercise.

#### **D. The '126 Patent**

The '126 patent addresses two problems that arise during the process in which tungsten is deposited into contact holes. There are two methods of depositing tungsten into a contact hole – “blanket tungsten,” which involves the reaction of tungsten hexafluoride and silane on the underlying dielectric to form a blanket tungsten layer, and “selective tungsten,” which involves the reaction of tungsten hexafluoride ( $WF_6$ ) with a silicon substrate. Each of these methods has its problems – the use of selective tungsten results in the creation of “worm holes” filled with  $WF_6$  form in the silicon, while the use of blanket tungsten results in the creation of “volcanoes,” or buildups of  $WF_6$  on the underlying dielectric and glue layer. The '126 patent teaches the use of a monolayer of silicon to prevent the formation of worm holes and volcanoes; this layer is formed in the contact hole in the dielectric and then is exposed to  $WF_6$ . The exposure to  $WF_6$  then forms the desired tungsten plug.

At trial, the jury found that claim 6 of the '126 patent, the only claim of that patent asserted, was not literally infringed by Atmel and was invalid due to anticipation. The language of claim 6 depends on the language of claim 5, which in turn depends on the language of claim 1 of the '126 patent:

1. A method of semiconductor integrated circuit fabrication comprising forming a dielectric upon a substrate;  
forming an opening in said dielectric, exposing said substrate;

forming a layer of material chosen from the group consisting of polysilicon and amorphous silicon within said opening, and overlying all of the exposed portion of said substrate and said dielectric, said layer not completely filling said opening;

exposing said layer of material to  $WF_6$ , thereby forming a tungsten plug which completely fills said opening, and forming a tungsten layer which covers said dielectric;

etching said tungsten layer.

....

5. The method of claim 1 in which a layer of refractory metal is formed within said opening prior to formation of said layer of material

6. The method of claim 5 in which a layer of material chosen from the group consisting of titanium nitride, titanium tungsten and zirconium nitride is formed upon said layer of refractory metal prior to formation of said layer of material.

'126 Patent at col. 3:12 through 3:27; col. 4:9 through 4:17.

1. Agere is precluded from moving for JMOL on the anticipation of claim 6.

Agere has moved for JMOL that claim 6 of the '126 patent was not invalid as anticipated. However, at the close of trial, Agere moved only for JMOL on the ground that claim 6 of the '126 patent was not invalid as obvious. In Duro-Last, Inc. v. Custom Seal, Inc., 321 F.3d 1098 (Fed. Cir. 2003), the Federal Circuit stated "In a pre-verdict JMOL motion on anticipation is not sufficient to support a post-verdict JMOL on obviousness; obviousness and anticipation are related, but are legally distinct and separate challenges to a patent's validity." *Id.* at 1107 (citing Union Carbide Chems. & Plastics Tech. Corp. v. Shell Oil Co., 308 F.3d 1167, 1188 (Fed.Cir.2002)). Though the grounds for the pre- and post-verdict JMOL motions are reversed in this case, the Court sees no reason that the Federal Circuit's holding would not apply here. As such, Agere is precluded from making a post-trial motion for JMOL on the anticipation of claim 6 of the '126 patent. The Court will analyze Agere's motion for a new trial based on the weight of the evidence regarding the anticipation of claim 6 below.

2. Agere's motion for JMOL that claim 6 of the '126 patent is obvious is invalid.

Agere has renewed its motion, made at the close of all the evidence at trial, that claim 6 of the '126 patent was not invalid as obvious in light of the prior art. Agere argues that Atmel presented no evidence at trial on the issue of whether the '126 patent was obvious in light of the prior art, as the testimony provided by Dr. Thomas related solely to Atmel's contentions that the '126 patent was invalid as anticipated and not enabled. The agreed-upon verdict form submitted to the jury in this matter did not include the question of whether the '126 patent was invalid as obvious and therefore, there are no findings of fact for the Court to review on the obviousness of the '126 patent. This motion is therefore denied as moot. See Am. Standard, Inc. v. York Internat'l Corp., 244 F.Supp.2d 990, 996 (W.D. Wis. 2002) (denying JMOL on issue not submitted to jury as moot).

3. The jury's verdict that claim 6 of the '126 patent is invalid as anticipated is supported by the great weight of the evidence.

Agere disputes that Atmel carried its burden at trial of showing, by clear and convincing evidence, that claim 6 of the '126 patent was invalid as anticipated. Specifically, Agere argues that Atmel failed to prove that Miyamoto discloses the formation of a layer of refractory metal within an opening in the dielectric and the formation of a layer of material chosen from the group consisting of titanium nitride, titanium tungsten, and zirconium nitride upon the layer of refractory metal prior to the formation. Atmel argues that a new trial is inappropriate, as the evidence produced at trial with respect to the Miyamoto reference, specifically the testimony of its expert, Dr. Thomas, and that of Agere's expert, Dr. Reif, shows that it discloses each and every element recited in claim 6 of the '126 patent.

Neither party disputes that Miyamoto discloses the formation of a refractory metal, but rather whether the testimony at trial was sufficient to support a finding that the refractory metal was formed within an opening in the dielectric. During Atmel's direct examination of Dr.

Thomas, he was shown Figure 5 of the '126 patent, which the patent shows as an embodiment of the invention, alongside Figure 1-B from Miyamoto, which that patent shows as a sectional view of its invention. 3/16/05 Tr. at 105. Dr. Thomas testified that Figure 5 shows one way to describe a layer of refractory metal being formed within the opening in the dielectric in a way that is consistent with the language of claim 5 of the '126 patent, upon which claim 6 depends. Id. at 106-07. He then testified specifically how Miyamoto Figure 1-B shows the same process as encapsulated in Figure 5, walking through the steps in both Miyamoto and the '126 patent – the formation of a layer of polysilicon or amorphous silicon, forming that layer within the opening in the dielectric such that it touches the underlying substrate, the filling of the opening with WF6, and the final etching of the tungsten layer. Id. at 107-111; 119-124.

Atmel also cites the testimony of Agere's expert, Dr. Reif, as supporting its jury verdict on anticipation. On cross-examination, Dr. Reif also viewed Figure 5 of the '126 patent and Figure 1-B of the '126 patent side-by-side. 3/17/05 Tr. at 194. He testified that it was his opinion that the layer of titanium in Miyamoto was not formed within the opening as taught by the '126 patent. Id. Nevertheless, he also testified that a comparison of the documents reveals that the inventors of the '126 patent chose to submit an illustrative drawing of their claims that is similar to the embodiment submitted by the inventors of the Miyamoto patent and to describe that figure as embodying the relevant claim language. Id. at 194-95.

In this case, the jury heard substantial, conflicting, competent, and believable expert testimony as to whether the Miyamoto patent described a layer of titanium that was formed within the opening in the dielectric. The jury resolved this question of fact in favor of Atmel. While Agere alleges that Dr. Thomas's testimony merely amounts to testimony that the figures in Miyamoto and the '126 patent were "similar," the Court finds that assertion to be unsupported

by the record. The Court finds that the jury's finding that Miyamoto discloses a layer of refractory metal formed within an opening in the dielectric to be warranted by the weight of the evidence.

Agere next argues that Dr. Thomas's testimony on the above language of claim 6 is not adequate to support a finding that Miyamoto meets all the limitations of that claim. Specifically, Agere states that Dr. Thomas failed to testify that the titanium nitride layer in Miyamoto is formed "upon" the layer of refractory metal and that, instead, he testified that the titanium nitride layer is formed on the dielectric. Atmel argues that the testimony of Dr. Thomas is sufficient to support the jury's finding of anticipation.

At trial, Dr. Thomas testified that Miyamoto discloses that a titanium nitride layer is formed "above the insulating film [dielectric] on the sunken substrate, but below the . . . silicon-based film." 3/16/05 Tr. at 119. Agere contends that this testimony establishes only that the titanium nitride layer is formed above the remaining dielectric but that it does not establish that the titanium nitride layer is formed within the contact hole, in which the layer of refractory metal resides. Dr. Thomas went on to testify that he read the language of paragraphs 10 and 11 of Miyamoto to mean that the layer of refractory metal "is attached to the TI nitride or TI tungsten film at all points along the surface." *Id.* at 120. He testified that Miyamoto clearly states that the purpose of the invention reflected therein was to improve the adhesion of the tungsten in the upper part of the contact hole through the use of the titanium nitride layer. *Id.* at 121. Thus, Atmel contends that the testimony at trial is certainly sufficient to support a finding that Miyamoto must show the use of a titanium nitride layer within the contact hole, upon the layer of refractory metal, because the jury could find that it would be nonsensical for Miyamoto to

state that the titanium nitride layer improves adhesion in the contact hole if the titanium nitride layer exists only on top of the dielectric and not inside the contact hole.

The Court agrees with Atmel. The combination of the testimony at trial given by Dr. Thomas and the Miyamoto reference itself are sufficient to support a jury finding that all the limitations of claim 6 are found in Miyamoto and that claim 6 is therefore anticipated by the prior art. Agere's reliance on a drawing contained in Miyamoto does little more than highlight the fact that there was some conflicting evidence in the trial record for the jury to consider. The overwhelming weight of the evidence, though, does not mandate a new trial on this issue. Agere's motion for a new trial on this point is denied.

4. The clear weight of the evidence supports the jury's finding that Atmel's accused processes did not infringe the limitations of claim 6 of the '126 patent.

Agere claims that the weight of the evidence at trial shows that Atmel's accused processes meet the limitations "forming a layer of material chosen from the group consisting of polysilicon and amorphous silicon within said opening, and overlying all of the exposed portion of said substrate and said dielectric, said layer not completely filling said opening" and "exposing said layer of material to WF.sub.6, thereby forming a tungsten plug which completely fills said opening, and forming a tungsten layer which covers said dielectric." Agere bore the burden of establishing Atmel's infringement of these limitations of claim 6 by a preponderance of the evidence. S. Bravo Sys., Inc. v. Containment Techs. Corp., 96 F.3d 1372, 1376 (Fed.Cir.1996). To that end, it offered the testimony of Dr. Reif and Atmel engineer Kim Schwechel, as well as the information contained in Atmel's own documents. Agere argues that given this testimony and documentary proofs, it has established that the clear weight of the evidence points to a verdict of infringement. Therefore, Agere argues that a new trial on the issue of whether Atmel's accused processes infringe the '126 patent is warranted. Atmel responds that the testimony of its

expert, Dr. Thomas, was sufficient for the jury to conclude that its processes do not meet the limitations of claim 6 recited above.

Again, the two-step infringement analysis of claim construction and comparison of the construed claims and the allegedly infringing devices, systems, or method applies. Ethicon Endo- Surgery, Inc. v. U.S. Surgical Corp., 149 F.3d 1309, 1315 (Fed. Cir.1998). As the Court has stated and restated, the parties agreed to let the ‘126 claims have their plain and ordinary meaning. Therefore, the only analysis for the Court is whether the jury’s finding of non-infringement is supported by the weight of the evidence presented on a comparison of the plain and ordinary meaning of the ‘126 terms and the accused Atmel processes.

At trial, the parties presented conflicting expert testimony as to whether the accused Atmel processes met the limitation of claim 6 of “forming a layer of material chosen from the group consisting of polysilicon and amorphous silicon within said opening, and overlying all of the exposed portion of said substrate and said dielectric, said layer not completely filling said opening.” The testimony at trial revealed that step 9 of the accused Atmel processes involved the exposure of the wafer to a silane gas that also contains a certain amount of hydrogen. Thomas 3/16/05; Reif 3/3/05 Tr. at 104. Dr. Thomas explained that the silane gas contains a “substantial” amount of hydrogen – four parts hydrogen to one part silane. Thomas 3/3/05 Tr. at 84. The result of the exposure of the wafer to this gas was the main factual dispute at trial with regard to whether the Atmel process meets the limitation of claim 6 that requires the formation of a monolayer of silicon.

Both Dr. Reif and Dr. Thomas agreed that, in order for Atmel’s process to result in a monolayer of silicon, the hydrogen atoms would have to separate from the silane atoms during the heating process so that one uniform layer of silicon could form on the substrate and the

dielectric. Reif 3/3/05 Tr. at 93; Thomas 3/16/05 Tr. at 83-85. Dr. Reif testified that, in his opinion, the deposition testimony of Atmel engineer Kimberly Schwechel and Atmel's internal documents showed that Atmel's process resulted in this separation and thus produced the required monolayer of silicon. Reif 3/3/05 Tr. at 99-102; JTX 2089. In rebuttal, Dr. Thomas testified, in detail, as to why he believed that the process used by Atmel could not result in the required monolayer of silicon. First, he testified that the relatively large amount of hydrogen present in the silane gas used by Atmel would retard the growth of a monolayer of silicon. Thomas 3/3/05 Tr. at 83-85. Second, Dr. Thomas testified that, even if the substantial amount of hydrogen present in Atmel's process did not suppress the formation of a layer of silicon, that the resulting layer of silicon would be at least one quarter silicon nitride because the silicon atoms would bond to the nitrogen atoms in the underlying layer of titanium nitride; such a situation, he testified would not be consistent with the formation of a monolayer of silicon. *Id.* at 90-91.

The jury heard testimony on this point from two credible and experienced expert witnesses who reached differing opinions as to the consequences of Atmel's use of a large amount of hydrogen in the silane gas to which the wafer is exposed. The jury resolved this question in favor of Dr. Thomas. The Court's review of the record does not indicate that this resolution shocks the conscience. As such, the Court finds that the jury's verdict of non-infringement should stand.

As the Court finds that Atmel presented sufficient evidence to support the jury's verdict of non-infringement of the limitation of claim 6 that requires "forming a layer of material chosen from the group consisting of polysilicon and amorphous silicon within said opening, and overlying all of the exposed portion of said substrate and said dielectric, said layer not completely filling said opening," the Court will not reach Agere's argument that the evidence at



trial was not sufficient to support a finding that its processes did not meet the limitation of claim 6 that requires “exposing said layer of material to WF6, thereby forming a tungsten plug which completely fills said opening, and forming a tungsten layer which covers said dielectric.”

5. The jury’s verdict on the invalidity of claims 1, 5, and 6 of the ‘126 patent due to lack of enablement is not supported by legally sufficient evidence; however, the jury’s verdict that the ‘126 patent is not invalid as indefinite is supported by legally sufficient evidence.

Again, Atmel bore the burden at trial of showing facts supported by clear and convincing evidence to prove the ‘126 patent invalid. The jury found that claims 1, 5, and 6 of the ‘126 patent was invalid as anticipated, but failed to find, as Atmel requested, that the claims were invalid as nonenabled and invalid as indefinite. Atmel now renews its motion for JMOL that the asserted claims of the ‘126 patent are invalid on these grounds.

The Court preliminarily notes that Atmel bears the burden of proof on this matter and so it must show that it has established its case for the nonenablement and indefiniteness of the ‘126 patent using evidence that no jury would be at liberty to disbelieve. The Court finds that while the jury’s finding that the evidence that claims 1, 5, and 6 are not inoperable as nonenabled regarding the formation of “a monolayer of silicon” is legally sufficient, as is its determination that those claims are not invalid as indefinite regarding the filling of “said opening.” However, the Court also finds that the jury’s finding that claims 1, 5, and 6 are not inoperable as nonenabled with respect to the claim of “exposing said layer of material to WF6, thereby forming a tungsten plug” does not have a legally sufficient evidentiary basis and therefore will grant JMOL in favor of Atmel on that issue.

Atmel argues that the jury did not apply the plain and ordinary meaning of the words “thereby” and “said opening” recited in claim 1 of the ‘126 patent in reaching its conclusions on the nonenablement of dependent claim 6 and that a proper interpretation would have lead the

jury to conclude that claims 1, 5, and 6 are nonenabled because they are inoperable. Indeed, in their moving papers and responses on this point, both parties engage in a great deal of argument as to the meaning of the words “thereby” and “said opening,” as those terms are used in the ‘126 patent. Like the jury, the Court will afford these terms their plain and ordinary meaning in considering whether the evidence at trial was sufficient to sustain the jury’s verdict that Atmel did not carry its burden of proof.

Like obviousness, the absence of enablement is a legal conclusion based on underlying factual inquiries. The presumption of validity that attaches to all patents includes a presumption that the patent complies with 35 U.S.C.A. § 112, which states that

[t]he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

35 U.S.C. § 112 ¶ 1. The enablement requirement of §112 mandates that, given what is already known, the specification teaches those in the art enough that they can make and use the full scope of the claimed invention without “undue experimentation.” Amgen Inc. v. Hoechst Marion Roussel, Inc., 314 F.3d 1313, 1334 (Fed. Cir. 2003). The scope of the claims must be less than or equal to the scope of the enablement, which is defined as “that which is disclosed in the specification plus the scope of what would be known to one of ordinary skill in the art without undue experimentation.” Nat’l Recovery Techs., Inc. v. Magnetic Separation Sys., 166 F.3d 1190, 1196 (Fed. Cir. 1999). The requirement that the level of experimentation be “undue” does not preclude a finding of enablement in situations where some experimentation is necessary to achieve an undescribed embodiment. PPG Indus., Inc. v. Guardian Indus. Corp., 75 F.3d 1558, 1564 (Fed. Cir. 1996).

Moreover, the utility requirement of 38 U.S.C. § 101 requires that the invention itself be operable to achieve useful results and specifically that the described result must be able to be obtained by the means described in the patent. See Raytheon Co. v. Roper Corp., 724 F.2d 951, 958 (Fed. Cir.1983); Brooktree Corp. v. Advanced Micro Devices, Inc., 977 F.2d 1555, 1571 (Fed. Cir. 1992); Process Control Corp. v. HydReclaim Corp., 190 F.3d 1350, 1358 (Fed. Cir. 1999). It is only when the claimed invention has a total incapacity to achieve what is claimed that it may be deemed inoperable. Raytheon, 724 F.2d at 956. The Federal Circuit has held that where a claim is inoperative, it not only fails to meet the utility requirement of § 101, but it also fails to meet the enablement requirement of § 112, because a person skilled in the art cannot practice the invention. Process Control, 190 F.3d at 1358.

First, Atmel argues that the ‘126 patent is invalid as inoperable because it is impossible to fill the opening in the dielectric with tungsten by exposing the polysilicon or amorphous silicon layer to WF6 alone. Neither party disputes that the use of a single-gas process is insufficient to fill the contact hole with tungsten and Agere’s own inventor and expert testified to this fact at trial. At trial, Dr. Chittipeddi described the process by which the layer of refractory metal at the bottom of the contact hole in the dielectric is exposed to WF6, which leads to the formation of a tungsten flood that completely fills that contact hole and forms a tungsten layer that completely covers the dielectric. 3/2/05 Tr. at 160. He explained that the exposure of the metal layer to the WF6 initially creates a “nice nucleating layer” and that the tungsten then starts growing, alongside another gas, to fill the contact hole all the way to the top. Id. (emphasis added). Agere’s own expert, Dr. Rana also testified that “there is no way that you can form a tungsten plug by just reacting WF6 in a monolayer of silicon.” Rana 3/3/05 Tr. at 100.

The jury was therefore given this indisputable fact and asked to apply it to the claim limitation “exposing said layer of material to WF6, thereby forming a tungsten plug which completely fills said opening, and forming a tungsten layer which covers said dielectric.” The Court finds that no reasonable jury, having heard the undisputed testimony of Drs. Rana and Chittipeddi, could have found that claim 6 is operable. The only means by which the jury could have made such a finding would be by interpreting “exposing said layer to WF6” to mean “exposing said layer to WF6 and another gas,” an interpretation that the Court finds no reasonable jury could accept. Agere argues that the jury could have accepted its testimony and argument that the claim language encompassed not only the use of WF6, but also another gas in combination with WF6. That, however, is not the invention it claimed in the ‘126 patent, which refers to a reaction between WF6 and the layer of amorphous or polysilicon. The patentee must contend with the consequences of the claim it actually wrote, rather than the one they, in hindsight, might wish they had written. See Chef Am., Inc. v. Lamb-Weston, Inc., 358 F.3d 1371, 1375 (Fed. Cir. 2004). Atmel’s motion for JMOL that claim 6 of the ‘126 patent is invalid as inoperable is granted.

Second, Atmel argues that the ‘126 patent does not teach one of ordinary skill in the art to form a monolayer of silicon. In support of its motion, Atmel cites to the testimony of Dr. Thomas in which he states that he “was not aware of any article or technique that said that [the inventors] could controllably generate one layer of [polysilicon or amorphous silicon].” 3/16/05 Tr. at 125. Atmel also cites to the videotaped deposition testimony of Dr. Chittipeddi played at trial, in which he states that he and the other inventors of the ‘126 patent were not aware of performing a silane soak, which is one method of forming a monolayer of silicon. 3/ 7/05 Tr. at 134. Atmel states that Agere presented no evidence to contradict this testimony and presented no

evidence that a person of ordinary skill in the art would have known how to form a monolayer of silicon without undue experimentation and that, as such, JMOL must be granted on the issue of invalidity for lack of enablement.

The Court has reviewed Dr. Thomas's testimony on this point, as well as the statements by Dr. Chittipeddi, and concludes that Atmel did not offer evidence of non-enablement such that the only reasonable conclusion that can be drawn from that evidence is one in Atmel's favor. First, though Dr. Chittipeddi testified that he was not aware of one method of forming a monolayer of silicon, it is clear that an inventor need not "correctly set forth, or even know, how or why the invention works" so long as the patent teaches how to achieve the claimed result. Newman v. Quigg, 877 F.2d 1575, 1581-82 (Fed. Cir. 1989). In addition, though Dr. Thomas's testimony is not as conclusory as Agere suggests, it remains insufficient to show that the trial and error required to practice the invention described in the '126 patent would be "unduly laborious or beyond the reach of one of ordinary skill in the art." Koito Mfg. Co., Ltd. v. Turn-Key-Tech, LLC, 381 F.3d 1142, 1155 (Fed. Cir. 2004). Moreover, as Agere rightly points out, the burden fell upon Atmel to overcome the statutory presumption of validity enjoyed by the '126 patent; Atmel cannot point to Agere's failure to rebut its testimony as evidence that JMOL is warranted on this issue.

Lastly, Atmel moves for JMOL on the theory that the '126 patent is invalid as indefinite. A further requirement of 35 U.S.C. § 112 is that "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 35 U.S.C. § 112, ¶ 2. Definiteness requires the language of the claim to set forth clearly the domain over which the applicant seeks exclusive rights, as a failure to do so deprives other persons and entities of notice as to what constitutes infringement

of the patent. The test for whether a claim meets the definiteness requirement is “whether one skilled in the art would understand the bounds of the claim when read in light of the specification.” Personalized Media Communications v. Int’l Trade Comm’n, 161 F.3d 696, 705 (Fed.Cir. 1998).

Atmel argues that the ‘126 patent is invalid as indefinite because it is impossible to determine to what “said opening” in claim 6 of the ‘126 patent refers, and that, if “said opening” must be construed as meaning the original volume of the contact hole, the claim must be held invalid as inoperable because it is impossible to fill the entire original volume after the additional layers required by claim 1 of the patent have been added. Again, Atmel bore the burden at trial of showing that the ‘126 patent was indefinite by clear and convincing evidence.

The Court will start with Atmel’s argument that the ‘126 patent is invalid as inoperable because it is impossible to fill the entire contact hole as initially defined in claim 1 (“an opening in said dielectric”) with the tungsten plug described later in claim 1 (“completely fills said opening”). Atmel argues that, because claim 1 describes additional layers that must be inserted after the contact hole is originally formed, namely a layer of refractory metal as required by claim 5 and a layer of titanium nitride as required by claim 6, the tungsten plug cannot possibly fill the entire original volume or capacity of the contact hole. Atmel cites to the testimony of Dr. Chittipeddi, who confirmed that the references to “said opening” used throughout claims 1, 5 and 6 refers to the original volume of the contact hole. Chittipeddi 3/2/05 Tr. at 188-89, 191, 192.

It is clear that the jury, in rejecting Atmel’s contention that the claim was invalid as inoperable, read the plain and ordinary meaning of the claim language to mean that the tungsten plug fills the remaining volume of the original contact hole after it has been partially filled by the layer of refractory metal and the layer of titanium nitride. Dr. Chittipeddi testified that this

was the understanding of the inventors as well, stating that the patent language is “saying fill the hole completely beyond the empty portion of the contact hole, that’s what it’s saying.” Id. at 197. The jury heard both parties’ theories as to what “completely fills” means in the context of the ‘126 patent and had legally sufficient evidence to conclude that the plain and ordinary meaning of “completely fills” requires that the tungsten plug completely fill whatever volume of the original contact hole remained after the layers of refractory metal and titanium nitride were placed in the contact hole.

Second, Atmel argues that if the jury’s verdict that the ‘126 patent is not invalid as inoperable on this point is supportable, it must find that the jury’s verdict that the ‘126 patent is not invalid as indefinite is not supportable, because it becomes impossible to ascertain what “said opening” means. The Court rejects this contention. The jury could well have found that the claim language, when read by a person of ordinary skill in the art, taught that “said opening,” as used in the claims of the ‘126 patent, referred back to the original opening created in the dielectric. Moreover, the jury could have found that the plain and ordinary meaning of “said opening” required only that the deposition of tungsten fill whatever volume remained in the opening in the dielectric taught in claim 1, not that the deposition of tungsten will the entire original volume of the original opening. A careful reading of the claims of the ‘126 patent fully supports the jury’s verdict on this point and Atmel’s motion is therefore denied.

#### **E. The ‘827 Patent**

The ‘827 patent addresses two problems that can arise during the etching of a dielectric. First, during the fabrication of a semiconductor chip, a layer of silicide is often placed over the substrate in order to minimize contact resistance and to improve electrical connections. When a layer of dielectric is placed over the silicide and subsequently selectively removed to create a

contact opening, there is a potential for the loss of a part of the silicide layer. The '829 patent teaches a method of depositing a silicide-forming material into a newly-created contact hole in order to replenish any silicide that was lost in the etching of the dielectric. Second, openings etched into the dielectric sometimes fail to align properly with the desired underlying contact region. The '827 patent teaches a method in which dopants are implanted into the contact region in order to extend that region laterally, such that any misalignment is cured.

At trial, the jury found that Atmel literally infringed claims 1 through 3 of the '827 patent, but that the claims were invalid due to obviousness. Claims 1 through 3 are set forth in the '827 patent as follows:

1. In the manufacture of semiconductor integrated-circuit devices, a method for making electrical contact to at least one contact region on a semiconductor body, said method comprising the steps of  
 depositing a dielectric layer on said body,  
 etching an opening into said dielectric layer, said opening exposing an area which comprises at least a portion of said contact region, said contact region comprising a silicide formed before said etching step,  
 implanting phosphorous after depositing said dielectric layer and etching said opening,  
 depositing silicide-forming material after etching and implanting,  
 heating in a non-oxidizing atmosphere, and  
 depositing a metal layer.
2. The method of claim 1 in which said contact region comprises titanium silicide.
3. The method of claim 1 in which said silicide-forming material comprises titanium.

'827 Patent at col. 4:45 through col. 4:65.

The only prior art offered by Atmel in support of its contention that the asserted claims of the '827 patent were invalid was the Hitachi patent. See Def.'s Ex. JTX 2117. The Federal Circuit has held that a single prior art reference can render a claim obvious. See, e.g., SIBIA Neurosciences, Inc. v. Cadus Pharmaceutical Corp., 225 F.3d 1349, 1356 (Fed. Cir. 2000). The party offering the prior art, however, must still make a showing of a suggestion or motivation to



modify the teachings of that reference to the claimed invention. Id.; see also B.F. Goodrich v. Aircraft Braking Sys. Corp., 72 F.3d 1577, 1582 (Fed.Cir. 1996). The proponent of the prior art may rely upon prior art reference itself, the knowledge of one of ordinary skill in the art, or the nature of the problem to be solved. Neurosciences, Inc., 225 F.3d at 1356 (citing Motorola, Inc. v. Interdigital Tech. Corp., 121 F.3d 1461, 1472 (Fed.Cir. 1997) (“[T]he suggestion to combine may come from the prior art, as filtered through the knowledge of one skilled in the art.”)). “The showing of a motivation to combine must be clear and particular, and it must be supported by actual evidence.” Teleflex, Inc. v. Ficosa North Am. Corp., 299 F.3d 1313, 1334 (Fed. Cir. 2002) (citing In re Dembiczak, 175 F.3d 994, 999 (Fed.Cir. 1999)).

The parties agree that the Hitachi patent teaches all the steps found in the ‘827 patent,<sup>5</sup> but in a different sequence. Specifically, the ‘827 patent reverses the order of two steps disclosed in the Hitachi sequence, namely the implantation of phosphorus dopants into a contact hole and the deposition of a silicide forming metal. In the Hitachi sequence, the latter process is performed first; in the ‘827 patent, the former process is performed first. Thomas 3/16/05 Tr. at 135. The sequence of these two steps is irrelevant to the end result of the overall process, but Hitachi’s developed sequence requires an additional heating step after the implantation of the phosphorus. Thomas 3/16/05 Tr. at 136, 166.

The parties agree that the main, if not the only, factual inquiry for the jury to resolve on the issue of the obviousness of the ‘827 patent is whether it would have been obvious to a person of ordinary skill in the art to reverse the steps in the Hitachi patent in order to arrive at the steps taught by the ‘827 patent. Agere argues that Atmel’s only evidence on this point was the testimony of Atmel’s expert, Dr. Thomas, which was insufficient to sustain Agere’s burden as it

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<sup>5</sup> The Hitachi patent and the ‘827 patent both teach a solution to the problem that arises in semiconductor fabrication when a contact hole cut in the dielectric is “misaligned.”

was impermissibly based on hindsight. Atmel argues that Dr. Thomas's testimony was proper and further reinforced by the testimony of Atmel engineer Michael Whiteman.

It is clear that in order to prevail on the question of obviousness, Atmel was required to produce evidence of a suggestion or motivation to modify the teachings of the Hitachi reference; namely to transpose the two steps and thereby eliminate the heating step. The only testimony offered on this point at trial was that of Dr. Thomas and Mr. Whiteman. Dr. Thomas, testified that, in his opinion, it would have been obvious to a person of ordinary skill in the art to reverse the sequence of steps in the Hitachi patent, because "people are always trying to eliminate steps if they can." Thomas 3/16/05 Tr. at 135, 137. Mr. Whiteman testified that, generally speaking, engineers would prefer a semiconductor fabrication process with fewer steps, as fewer steps leave fewer opportunities for imperfections to creep into the fabrication process. Whiteman 3/14/05 Tr. at 56. This testimony merely expresses a general desire to eliminate steps in the process of semiconductor fabrication as opposed to a specific motivation to eliminate this particular heating step. The law of obviousness requires evidence of the latter to render a patent invalid; the weight of the evidence at trial therefore does not support a finding that the '827 patent is invalid as obvious. Agere's motion for a new trial on the issue of the obviousness of the '827 patent is granted.

#### **IV. CONCLUSION**

The various post-trial motions filed by Agere and Atmel in this matter are granted in part and denied in part. Agere's motion for a new trial on the invalidity of the '827 patent is granted and the remainder of its motions for JMOL and a new trial are denied. Atmel's motions for JMOL on the invalidity of the '126 patent as nonenabled and the invalidity of the '335 patent as

obvious are granted and the remainder of its motions for JMOL are denied. An appropriate Order follows.

IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

AGERE SYSTEMS, INC.,  
Plaintiff,

v.

ATMEL CORPORATION,  
Defendant.

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CIVIL ACTION

NO. 02-CV-864

ORDER

AND NOW, this 17th day of August, it is hereby ORDERED that the Motion for Judgment as a Matter of Law, or in the Alternative, for a New Trial filed by Plaintiff Agere Systems, Inc. on April 5, 2005 (Doc. No. 335) is GRANTED in part and DENIED in part. Agere's motion for a new trial on the invalidity of the '827 patent is GRANTED. Agere's other motions for judgment as a matter of law and for a new trial are DENIED.

It is further ORDERED that the Motion for Judgment as a Matter of Law filed by Defendant Atmel Corporation on April 5, 2005 (Doc. No. 336) is GRANTED in part and DENIED in part. Atmel's motions for JMOL on the invalidity of the '126 patent as nonenabled and the invalidity of the '335 patent as obvious are GRANTED. Atmel's other motions for judgment as a matter of law are DENIED.

BY THE COURT:

/s/  
Legrome D. Davis, J.